



THE NEW YORK CENTRAL ELECTRIC SERVICE.

The purchase by the New York Central of a controlling interest in the Syracuse Rapid Transit and the Utica & Mohawk Valley electric lines was discussed in the *Railroad Gazette*, July 22. Announcement has now been made more fully in regard to the steps which have been taken to make the trolley lines across New York State, which have been such formidable competitors of the steam road, allies and feeders to the main line.

Apart from the short haul competition around Utica, which was taken care of by the Utica & Mohawk Valley purchase, the most threatening competitive territory was that lying between Syracuse and Rochester, and especially the strip of country south of the main line served by the old Auburn road of the New York Central. The immediate plans of the steam road provide for the electrification of the West Shore between Utica and Syracuse and of the Auburn road between Syracuse and Rochester. When this is accomplished one of the two great advantages possessed by electric roads in their competition with steam roads for short haul traffic will have been provided for. This is the economy of being able to run a frequent service in small units. The other great advantage of the interurban companies—that of being able to collect their traffic in the city streets, thus affording a service far more convenient to short distance travelers than that provided from a city terminal—will be gained when the full plans are carried out, by running the cars singly through the streets much after the present fashion and then assembling them in multiple unit trains for the between-towns part of the trip. Although this system, involving the use of the old steam line between cities, precludes the use of the main streets of the intermediate towns as a transportation route, it is not expected to make much difference in this specific locality, since the Auburn road runs directly through the small places along the way instead of a mile or so away from them, as has often been the case in territory where the electric roads have been able to exert the most successful competition. The Auburn road will be rebuilt for the traffic, and it is thought that this plan will combine in a highly advantageous manner the terminal convenience and small unit economy of the electric roads with the high speed possible on a solidly built line running on private right of way. Short-haul traffic from Little Falls all the way to Rochester will be taken care of in this way by the present plan. Afterwards it seems wholly likely that the idea thus placed in experimentation will be extended to provide an electric service right across New York State.

This principle of running interurban cars singly through city streets and then assembling them into multiple unit trains worked on private right of way between short-haul terminals is such an admirable solution of the electric competition problem and one which can be so readily put into operation,

that it must be a matter of surprise to all who have studied the problem that it should have been developed so late. The competitive points in the country where some plan similar to this can be put in operation are legion. All through Massachusetts, Connecticut, Ohio, Indiana and Michigan, to cite only the most striking instances, conditions exist similar to the one now being met by the New York Central. Whether or not the New Haven road, by its recent purchase of trolley control, intends to carry out a similar plan must be a matter of conjecture, but it would seem highly advantageous for that road to pick up short-haul traffic in the streets of such cities as New Haven, Bridgeport and Hartford in its interurban cars and then assemble them in multiple unit trains and maintain a fast local service to points where the electric competition had been severe.

In one of the series of articles which have been printed in the *Railroad Gazette* during the last two or three years discussing electric competition, it will be recollected that a manager of interurban roads was quoted as saying that there should be three distinct kinds of railroad service: that for through traffic; a purely local short-haul service at moderate speed, such as is now conducted by interurban lines, and a service midway between the two designed to combine convenience, rapid transit and economy in hauling passengers for distances of forty or fifty miles. By control of the interurban lines in New York State the New York Central provides for the local short-haul and feeder traffic. By electrification of branch lines to be worked as noted above—by interurban cars assembled in multiple unit—the intermediary service is also provided, for the first time, leaving the main lines to perform their own function of through traffic, for which they are best adapted and equipped.

The possibilities of the extension of this development seem almost boundless, both from the standpoint of the traveler, who will be furnished real rapid transit on short journeys, and from the standpoint of the operating companies, who have only to look at the tremendous new business created by the electric roads to realize the profit which goes along with a convenient and popular service. The intermediary electrified branch line service presents many new problems in electrical traction, for it is in its essentials quite a radically new proposition, but it is reasonable to expect that in the present state of the art of electric transportation these problems will not long remain unsolved. It is fair to say that the lesson just taught by the New York Central and New Haven roads in gathering in their short-haul competitors to form a systematic and centralized transportation system where before was a scattered and half-met competition, is the most important event in the history of short-haul transportation since first the local city and village trolley lines began to join hands with one another and to create the word "interurban" in its present significance.

DEVELOPING MICHIGAN FRUIT TRAFFIC.

An account is given in another column of an interesting decision by the Interstate Commerce Commission holding that the charges for icing the refrigerator cars which are used in shipping fruit from Western

Michigan are exorbitant, the evidence showing that since the two roads—the Pere Marquette and the Michigan Central—have made exclusive contracts with the Armour car lines the charges for refrigeration have been increased from 50 to 150 per cent. On the face of this report the case against the railroads would seem to be almost conclusive; but a perusal of the full text of the opinion shows that there may be something to say on the other side. But whether there is or is not, the full report, prepared by Commissioner Prouty, who is always lucid and forcible, makes very interesting reading. It shows the present condition of the fruit shipping business in Western Michigan in nearly all of its details. The industry is quite new, however, and it looks as though the lower rates of two or three years ago, with which the present high rates are compared, had been made by the railroads experimentally with a view to development of the traffic. And, indeed, the Commission evidently recognizes this aspect of the case, for it refrains from making any specific recommendation; it says that the railroads and the refrigerator company can adjust the irregularities much better than can the Commission, and therefore the matter is left open until October 1. If, by that time, no readjustment has been made, the Commission will take further action. It began the present investigation on its own motion.

The statement of facts shows that peaches, pears, plums and berries of all kinds grow in great abundance between Lake Michigan and the Grand Rapids & Indiana Railroad. Fruit growing has largely increased during the last 15 years, and during the last three or four years the railroads have stimulated it by furnishing refrigerator cars for shipments to distant cities. In 1903 the Pere Marquette shipped 6,000 cars and the Michigan Central 600. Of the 6,000 cars, 1,700 were iced; and of the 600 about three-fourths. Shipments are made to Boston, Duluth, Dubuque, and other distant places, and a car is usually gone four weeks. The traffic manager of the Pere Marquette says that he needs 2,500 refrigerator cars at the beginning of the season, which lasts only three months and which is active only about six weeks; but Mr. Prouty thinks that 1,000 would be enough. Until 1902 the Pere Marquette got its refrigerators from its neighbors, but this was not satisfactory, as shippers frequently desire to change destinations, and railroad companies will not allow their cars to be diverted. The Pere Marquette made a contract with Armour at the beginning of the season of 1902, the car company furnishing the ice and taking the responsibility of icing through to destination. The railroad company pays 7½ mills a mile for the cars and agrees not to use other refrigerators for foreign shipments, while the car company has the privilege of charging the shipper for its services. The Michigan Central has a similar contract. The Armour lines (a consolidation of the Fruit Growers' Express, the Kansas City Fruit Express, and the Armour Refrigerator Lines) owns 6,000 refrigerators devoted to the fruit traffic; and the Continental Fruit Express, an allied concern, owns 1,500. The Continental Fruit Express is another affiliated company, and there are no others of consequence in the country; so that the

Michigan roads could not get a fair supply of refrigerator cars from any other source and could not satisfy the needs of their shippers in any other way than they do unless they were to have refrigerators made for themselves. Up to about four years ago the railroads furnished the ice free; in 1901 and 1902 they charged for it at cost, and connecting roads had to look after reicing. Now the car company does this, having ice houses and agents at suitable points, and charges, for example, \$55 a car to Boston, where the railroads, when they charged cost, collected only \$20. To Dubuque, Iowa, the freight is \$110; ice, formerly \$7.50 to \$15, is now \$37.50.

Before the contract was made the principal trouble was lack of a reliable supply of cars, though at Grand Rapids, where competition was active, cars were always in good supply. A number of shippers testified that they were satisfied with the present arrangement. The cost is increased but the service is much better. These witnesses were brought to the hearings without expense to themselves, but "there is no reason to doubt their honesty." One reason for the increased charge is that the cars now used carry four to five tons of ice, about 60 per cent. more than those formerly used. Ice costs \$2.50 a ton and the quantity used appears to be not over 10 tons to the car, even on long journeys. Comparing this with the charges made, the Commission concludes that the Armour Company collects very much too large a sum for superintendence. One shipper, Moseley, of Grand Rapids, owning 30 refrigerator cars for his own use, furnishes his own ice, receives 7½ mills for his cars, and pays the railroad for reicing on the road at actual cost. The cost per car for refrigerating is invariably much less than in Armour cars, usually about one-half the Armour charges.

In view of all these facts, the Commission, as before stated, holds that the charges for refrigerating service in Armour cars ought to be reduced. As a preliminary to this, and by way of additional justification of its action in taking up the question, the Commission holds that the furnishing of refrigerated cars is a public duty. The opinion says:

We think that it is the duty of the respondent railroad companies to furnish refrigerator cars for the transportation of this fruit. While it is possible that these carriers might at the outset have legally declined to provide this special kind of equipment, they ought not to be permitted to do so at this time. For years they have voluntarily made such provision, and this industry has grown up upon the strength of that arrangement. Such cars are generally furnished in all parts of the country when required for this species of traffic. While a refrigerator car costs somewhat more than an ordinary box or flat car, the additional expense is not great. Railroads at this day might as well decline to provide stock cars for the transportation of live stock as refrigerator cars for the carriage of perishable commodities. But this duty does not spring from the Act to regulate commerce, nor has this Commission any jurisdiction of that matter. It arises out of the common-law liability of the defendant railroad companies as common carriers, and redress for failure to fulfil it must be sought in the courts.

The defendant railroads may provide such cars either by purchase on their own account or by lease from other roads, and if the latter plan is adopted they may undoubtedly enter into exclusive contracts like that before us. This has been settled by the Supreme Court of the United States. Whether the carrier is legally compellable to furnish ice for the refrigeration of such cars is more doubtful. In our opinion it should be. While the shipper might attend to the initial icing, he could not, without great difficulty, provide for reicing en route. If the railroads were to insist that it should be done by the ship-

per in each instance, it would result in throwing the transportation of perishable commodities into the hands of a few large shippers, who could afford to provide the necessary icing facilities. That the carriers can, without great inconvenience, furnish ice is evidenced by the fact that for a long time they have and in many cases still do so. These lines provide ice for the shipment from Michigan points of dairy products and all other commodities except fruits.

So much for the Commission's view of the duty of the railroad to the public. As to the abstract justice of a law compelling a railroad to furnish refrigerators, where there is a considerable volume of perishable freight, there cannot be much difference of opinion, and probably the courts would quite readily sustain any law which a fair-minded legislature might pass. Former luxuries are now necessities, and the courts are ready to do their share toward keeping our civilization up to date. The practical application of such a statute is, however, another matter. With the fluctuating character of such a traffic as that in fruit, the shortness of the season and other risks, a railroad may well find many difficulties in deciding how much money it can reasonably expend for stimulation and development, or even for minimum accommodations; and where a railroad company deems it profitable to neglect the traffic it will be difficult for the State to force or coerce it into doing otherwise. Difficult, we mean, because the reasons that actuate the railroad officer will also have their effect on the officer of the State; he will find it hard to decide what is equitable.

The immediate question with the railroads in the Michigan case would seem to be, not their duty to the State, but their duty to themselves. They gave this fruit traffic a good start by furnishing ice at cost. Having after a time decided, apparently, that they were giving the fruit man too much for his money, they increased the charges; but in so doing they took in a partner—the refrigerator car company—which may have been so greedy as to check the growth of the traffic, or even have caused it to decline. An increase of 33 per cent., or even a much smaller increase, in the selling price of a basket of peaches at Boston or Dubuque would, we should think, have a pronounced effect on the total quantity sold, and therefore on the traffic of the railroads. Commissioner Prouty may have to study the traffic for a number of years before he can decide whether the time of the icing-boss at Buffalo, or Karner, or some small division terminus, is worth ten dollars a car, or one dollar for ten cars, or some figure between these two; but the traffic manager of the railroad ought to be able to decide quite readily whether a reduction in the cost of delivering fruit at any given point would increase the movement to that point.

The paper published in *Ganton's Magazine* by Mr. H. T. Newcomb, part of which is reprinted elsewhere in this issue, was intended by the author as a reply to a recent magazine article published by Mr. Prouty, of the Interstate Commerce Commission, in which it was alleged that the railroads were imposing a constantly increasing burden upon the public at large by increases in their rates. Mr. Prouty is well known as an advocate of enlarged powers for the Commission, and his maxim that "the only way to regulate rates is to regulate them" has been widely quoted. Without refuting this proposition

directly, Mr. Newcomb reviews the situation as an economist, and devotes his argument to the fundamental principle, often overlooked, that the cost of any commodity, in the broad sense of the word, or of any service rendered, is entirely a relative thing, and that an arbitrary sum in dollars and cents is quite meaningless unless its purchasing power be taken into account. No one would deny, for example, that the great difference in industrial wages here and in Germany is due in large part to the difference in the cost of living in the two countries, yet Mr. Prouty neglects to apply this same principle in his assertion that recent increases in railroad rates are a mere arbitrary measure, carrying with them an increased purchasing power that enriches the transportation companies at the expense of their customers. Money is only useful for what it will buy, and Mr. Newcomb clearly shows that the railroads are able to buy less, instead of more, with the recompense received for a unit of service rendered, than they were five, ten, or twenty years ago. Railroad rates, therefore, when viewed from their purchasing power, or "control over commodities," as the author expresses it, have been growing steadily less, rather than greater.

July Accidents.

The condensed record of the principal train accidents which occurred in the United States in the month of July, printed in another column, contains accounts of 17 collisions and 37 derailments. Those which were most serious, or which are of special interest by reason of their causes or attending circumstances, occurred as follows:

Date.	Killed.	Inj'd.
1. Laquin, Pa.	3	16
2. Tony, Wis.	3	16
3. Litchfield, Ill.	24	45
5. Frankford, Pa.	2	1
5. Cameron, Colo.	3	60
5. Oakford, Ill.	1	15
6. Woodbine, Iowa	1	2
10. Midvale, N. J.	16	69
13. Glenwood, Ill.	18	25
16. Shippen, Pa.	2	3
23. Atglen, Pa.	0	0

The three most notable cases in this list have been noticed in former issues. In a disaster like that at Litchfield a measure of relief is felt when it is discovered that the misplacement of the switch is not chargeable to the negligence of an employee; but this feeling would be far more comfortable, and less qualified by regrets, if switches on American railroads were more generally connected with cabins and protected by distant signals or electrical indicators, or both. We assume that in this case the switch was so situated that the engineman had only a few seconds' view of it before he was upon it. This being so, the safety of fast trains depends in a measure on the incessant vigilance of the engineman; inattention on his part for a second or two may make the difference between life and death for a passenger or a trainman. Such a requirement is an unreasonable burden to put upon the engineman, day after day and year after year. It is true that interlocking and distant signals, and even a continuous track circuit, may not always thwart a train-wrecker; but it is also true that a good share of the persons who attempt to wreck trains do seem to be half hearted. Many of them are half witted or worse. They do not pursue their object with vigor, intelligence and persistency, and it seems quite likely that systematic and thorough repressive measures would be effective in some cases where our present loose protective measures are not effective. The equipment of a railroad with

interlocking and block signals not only makes it more difficult for a miscreant to accomplish the breaking or physical disturbance necessary to carry out his purpose, but also aids in keeping the line clear of lawless persons by the increased number of patrolmen employed. The presence of signalmen, repairmen and inspectors tends to improve the morale of the roadway force as a whole.

The Midvale collision occurred under the telegraph block system. The question whether the system was being worked at its best—that is, whether the signalman who was at fault was a man of the right temperament, working under favorable conditions and with all apparatus and accessories in good condition, and the discipline perfect—are questions which probably will not be answered, as there is no public investigating body in New Jersey. However this may be, such a serious collision is likely to give an impetus to the movement among American railroads to increase the use of automatic block signals. At Midvale the line is single track, so that the most approved provision against collisions, according to the present view of signal engineers, would be the electric train staff or controlled manual block signals, though automatic track-circuit signals would meet every requirement, so far as rear collisions are concerned. The Erie has a considerable mileage of its double-track road equipped with controlled manual signals, but we do not hear of the extension of that system either on the Erie or elsewhere.

We have no important information concerning the Glenwood collision beyond that given in our issue of August 5, page 220, except that Thornton was not a block-signal station and the brakeman on the freight had been in the service only six months. As the Chicago & Eastern Illinois is recorded as a block signaled line it is of interest in a case like this to know just how and to what extent the block working was modified or suspended. To run a train against the current of traffic, on double-track, obviously requires an interruption of the normal procedure. This appears to have been done in this case by the direct orders of the train despatcher. It is desirable, of course, in such movements to run all trains from block-station to block-station; and running from Thornton, not a block station, or using the crossover there, was objectionable. If avoidable it was more than objectionable. The agent at such a station would be less likely to use all precautions within his power than would a man more familiar with space-interval processes. The existence of a crossover at any other place than a block station is also objectionable, as is an unprotected switch a long distance from a station, like that south of Thornton, connecting the west siding to the southbound track. This road is no worse in this respect than many others, operating thousands of miles; but that does not make the practice any better. Care must be taken not to discredit the block system by charging it, in whole or in part, with collisions which occur where it is nominally in use but where the appliances and the practices are admittedly imperfect. A satisfactory telegraph block system presupposes the protection of all switches and crossovers in such a way as to make sure that no train or engine can enter any part of any block section without the knowledge and consent of the signalman at one end of the section. This implies, of course, the knowledge and consent of the man at the other end also, as free communication between the two signalmen is a fundamental feature of the system. The admission of two trains within

a single section at the same time is admittedly a suspension of the space-interval principle, demanding the utmost precaution.

We are not unmindful of the fact that Engineman Hoxie appears to have been grossly reckless and that his testimony is unobtainable because he has disappeared; the points which we have presented need to be considered, nevertheless, by reason of their bearing on the general discipline of engineers. Conductor Cooper appears not to have given Hoxie any very clear and emphatic instructions at Thornton; so that the impression conveyed by the first reports, that Hoxie had recklessly disregarded the conductor's orders, may not be correct.

The number of electric car accidents reported in the newspapers for July was 27; in which six persons were killed and 147 injured.

Railroad Losses from the Packing House Strike.

Figures showing the receipts and shipments of packing house products at Chicago since the beginning of the strike are indicative of the immediate loss which the railroads have suffered. Provided the strike is not too long continued, abnormal movements of livestock and provisions at its conclusion should in considerable part make up for this loss, but, unlike the situation at the time of the anthracite coal strike, it is evident that much of the meat consumed in the eastern cities is being supplied locally. It is hardly to be expected, therefore, that the demand for provisions shipped through from the west after the strike is settled will compare in proportionate volume to the heavy movement of coal after the close of the coal strike.

Livestock receipts at the Chicago market for three weeks subsequent to the inauguration of the strike numbered 9,710 cars, and shipments were 3,815 cars, exclusive of horses. For the corresponding period last year the respective figures were 17,096 and 4,585 cars, the decrease amounting in the first case to 43 per cent. and in the second, to 17 per cent. Shipments of packing house products between the first of July and the middle of August had fallen off from one-quarter to one-half on different commodities as compared with the similar period for 1903, the percentages being as follows: Dressed beef 44 per cent.; canned meats 16 per cent.; other meats 19 per cent.; lard 30 per cent.; barreled pork 43 per cent.; beef packages 56 per cent. There is also more or less interchange of products between the packing centers, yielding a considerable traffic in the aggregate, which has shown a marked decrease. The percentages of decrease at Chicago for the several commodities listed above, for the same periods, were 34.5 per cent. for dressed beef, 33 per cent. for canned meats, 37 per cent. for lard, 21 per cent. for barreled pork, and 42 per cent. for beef packages. The items of "other meats," as might have been expected, increased to a total of 21 per cent.

Another strike loss is that sustained by the switching roads at the different packing house points. At Chicago all cars into and out of the stock yards are handled by a single terminal company, whose losses during the strike will be proportional to the decrease in the number of cars received and despatched. But the net current losses are probably somewhat less than the foregoing figures would indicate, due to the efforts of many of the smaller, and so-called independent, packers and butchers, whose business is not included in the market reports, to meet the demand created by the strike.

TRADE CATALOGUES.

The Wellman-Seaver-Morgan Company, Cleveland, Ohio, sends a booklet containing an explanation of what it does. This company carries on a general engineering and manufacturing business, such as designing and building new plants, modernizing old plants, designing and building special equipments, etc. In fact, anything from the taking of the ore out of the mine to turning it into completed product. The booklet is illustrated throughout with a number of half-tones showing various installations made by the company. Illustrations are also given of the Wellman-Street steel car and truck bolster.

Rodger Ballast Car Company, Chicago, has prepared a neat little pamphlet entitled "Useful Hints About Railway Cars," the type discussed being the Rodger ballast Hart convertible design. The discussion is presented under seven heads, viz., adaptability, economy, simplicity, durability, practicability, special work, and details. It is followed by views and cross-sections of the different classes of cars, which include the World's Fair type, 150 of which are now used to haul coal to the Exposition. Their load limit is 110,000 lbs. and their cubic capacity 2,300 cu. ft. The Rodger double plow distributing car is also shown.

The Kennicott Water Softener Company, Chicago, has reprinted and issued in pamphlet form the article on "Water Softening on the Union Pacific," by A. K. Shurtleff, Assistant Engineer of the road, printed in the *Railroad Gazette*, June 24, 1904. The pamphlet is 9x12 and is printed in two colors on heavy cream-colored paper. A large half-tone view of some one of the Union Pacific softeners faces each reading page, and the front cover appropriately bears the Union Pacific emblem in colors.

The Gisholt Machine Company, Madison, Wis., has sent us the first five pages of its new bulletin. Accompanying these leaves is a neat cover in which to bind them, as well as future leaves which the company proposes to publish. Illustrations and descriptions of various machines made by the company including its big bore turret lathes are shown. A detailed description of the method of machining different pieces of work, as well as illustrations of the work done on these machines, is also given.

Jenkins Bros., New York City, have just issued a booklet bearing the title "Valve Troubles and How to Avoid Them." The first part is devoted to the difficulties encountered in the installation and use of valves, and suggestions for the remedy of these difficulties. The balance of the book is devoted to illustrations and descriptions of the principal valves made by this firm, including a transparent half-tone which shows the construction of the "excelsior" straightway back pressure valve.

The Abner Doble Company, San Francisco, Cal., sends a pamphlet descriptive of its tangential water wheels. These wheels are made to operate under high heads of water and are provided with patented ellipsoidal buckets. A detailed description and illustrations of the different parts of the wheel are given. There is also a line drawing showing a 160 h.p. water wheel direct connected to a 100 k.w. Crocker-Wheeler generator.

This machine runs at 700 r.p.m. under a pressure of 300 lbs. per sq. in.

The S. Obermayer Company, Pittsburg, issues its August bulletin. It contains an interesting article on "The Locomotive Industry," by Frank Fayant, which is the first of a series to appear, and the paper on "Labor-Saving Suggestions for the Foundry," by H. F. Frohman, read at the Indianapolis meeting of the American Foundrymen's Association. It also contains other miscellaneous matter of interest to foundrymen. The publication of the Bulletin at Pittsburg was begun with this number.

The Ingersoll-Sargeant Drill Company sends an illustrated pamphlet bearing the title "Before and After." Two illustrations are given showing the North Amherst quarry of the Cleveland Stone Co. before and after the installation of a central compressed air plant. Comparative costs are given for operating the machinery in this quarry by steam and by compressed air, which shows a daily saving of \$164.95 in favor of compressed air.

The Baltimore Gas Machinery Company, Baltimore, Md., is issuing a pamphlet descriptive of its suction gas producers. The pamphlet contains a number of facts which are of interest to those who use gas engines. A complete description and general drawing of the machine is given. An itemized comparison of the cost of power produced by electricity, city gas, gasoline, steam with soft coal and Producer with anthracite coal are also given.

The Engineering Company of America, New York City, issues a pamphlet called "Concrete Construction." It is bound in an appropriate colored cover and contains an interesting preliminary treatise on concrete and concrete construction. Illustrations of buildings and bridges constructed of concrete are given as well as line drawings showing the different methods of re-enforcing concrete with steel.

The Steel Car Forge Company, Pittsburg, has just issued a new illustrated catalogue of forgings for steel and wooden freight cars, mine and special forgings, and chain manufactured at its works at Ellwood City, Pa. It is 6 x 9 inches in size, printed on plate paper with cover stamped in gold. There are about 40 pages of illustrations and descriptive matter conveniently indexed for reference.

The Worthington steam-hydraulic accumulator is described in Bulletin 100 published by Henry R. Worthington, New York City. This device consists of an ordinary steam cylinder combined with a ram cylinder similar to that of a weighted hydraulic accumulator, and is applicable to all purposes requiring the storage of water under high pressure.

The General Construction Company, Seattle, Wash., has issued a catalogue descriptive of the Bewsher sand pumps and gold dredging machinery. This catalogue is intended for those who are interested in "placer mining." It is illustrated throughout with both half-tone and line drawings.

The Barnett Equipment Company, Newark, N. J., sends a pamphlet describing the "Barnett Connector." This is a device which automatically couples the air, steam and signal hose and the safety chains between the

cars. A full page half-tone illustration of the device is shown.

R. D. Wood & Company, Philadelphia, Pa., have issued a pamphlet bearing the title "Gas for Power and Fuel." A description and illustrations of Producer gas power plants are given. Also a short description of "Mond Gas" and of gas producers for metallurgical use.

The B. F. Sturtevant Co., Boston, has issued a new economizer catalogue. This contains the details of the Sturtevant standard and pony types of economizers, and also treats of the subject of mechanical draft and natural draft. It should be of interest to all steam users.

The Betts Machine Company, Wilmington, Del., sends a catalogue of boring and turning mills. About 18 machines of this type are illustrated and described. The attachments used on these machines are also shown in detail.

CONTRIBUTIONS

Collisions Caused by Misreading Train Orders.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read your note of August 5, page 207, calling attention to Government Bulletin No. 11, which records four seemingly unnecessary collisions in 12 months resulting from failure to observe the word "second" in train orders. Before I can bring myself to believe that all of these orders were misread by the men in responsible charge of the trains, and also by the brakemen and firemen, such fact will have to be positively asserted. It is improbable that this number was covered by the thumb of every one of these men while scrutinizing the orders. In a former communication (*Railroad Gazette*, April 8, page 265,) I called attention to the fact that many officials are opposed to the practice of one man reading an order to another, on account of the many disasters that have resulted from so doing. Many men have omitted words or read orders in a way that would give the listener an impression not warranted by the language of the orders; wrong impressions which would have been at once noticed and, no doubt, corrected, if each man had been required to himself carefully scan his instructions. Hearing an order misread often lodges an impression in the mind that a personal inspection may not efface. Then there is always the chance that after hearing an order read the listener may pocket it without taking the precaution to look it over. It is regrettable that we have not the facts at hand to show whether or not in cases of this kind the orders complained of were read by all of the men employed on the train, or whether some of them were only told of the contents of the orders. Were they read to the engineman by the conductor and then handed to the fireman, or did the fireman content himself with hearing the orders read and allow his engineman to retain them without demanding that they be given to him to read? What possible objection can there be to each man reading orders, instead of having them read to him? Quite likely the orders would be afterward discussed and any possible misunderstanding thus corrected.

The writer is an enthusiastic supporter of the Revised Code, but when under those rules any particular kind of accident becomes abnormal and it can be shown that modification will reduce the list the plain lesson is

to continue revising until trains can be safely moved, regardless of preconceived opinions. Rules theoretically sound are execrable if in practice it be demonstrated that collisions have not been materially checked by their use. If it is a fact that some known safe practice has been discontinued merely to economize telegraphing perhaps it would be wise to take a little more time, even if here and there an extra \$300 or \$400 a month must be expended for another set of despatchers. After a superintendent has cleared up a few wrecks which have resulted from strict adherence to Code rules he cannot be blamed if he becomes a warm advocate of revision. You remember the story of the Irishman in jail: To him, the beautifully logical deductions of his attorney, showing that he could not be placed behind the bars were of no comfort; he was in duress vile notwithstanding, and was principally concerned in gaining his liberty.

There is a growing conviction that a mistake was made when the word "section" was dropped from the rules. On roads that have departed from the former practice of spelling figures in duplicate there would be strong opposition to the suggestion that the custom be returned to, but it is doubtful if many would object to the word "section." If a train order were to instruct that 2d No. 1 (too commonly written 2d 1) would run one hour late, the section named is often the first word written near the upper left hand corner of the blank and is so situated that it may be easily overlooked or hidden; there is not so great likelihood of this occurring if the word "section" follows "2d." As "section" will make the order fully as clear as if the number of the section were to be spelled out, and is a word that will be generally acceptable, it is to be hoped that, beginning at once, it will hereafter be inserted in orders.

In all fairness, it must be admitted that while this particular phase of the matter may be thus substantially remedied there yet remains an opening for error if a 3 is mistaken for a 5, or 4 for 6, when trains bearing these numbers are on a district at the same time. Perhaps the rule hardest for hundreds of railroad officers to accept with equanimity is the one directing that time be expressed only by figures. Yet few accidents have occurred through overlooking the time in orders, or because the figures were so badly formed that they were misread. It is decidedly safer to express 10 by numerals only than to also spell it out, (10 ten). This sometimes creates the impression that a train has until ten minutes after the hour to make a station.

H. W. FORMAN.

Excessive Charges for Icing Refrigerator Cars.

The Interstate Commerce Commission, in an opinion by Commissioner Prouty, has announced its decision in the matter of charges for the transportation and refrigeration of fruit shipped from points on the Pere Marquette and the Michigan Central, a case involving refrigeration charges on cars furnished by the Armour Car Lines.

The Commission holds that in the transportation of fruit from points in Michigan it is the common law duty of the railroad companies to furnish refrigerator cars for such service; that they may provide such cars by purchase or by lease, and if the latter plan is adopted they may make contracts with one company which exclude the use of cars owned by other companies; that carriers should, in the opinion of the Commission, be legally compellable to furnish ice for the refrigeration of refrigerator cars

used upon their lines, but if it is not part of the obligation of a common carrier to provide such refrigeration, when the carrier does furnish it and at the same time prohibits the shipper from obtaining it from any other source, the charge for refrigeration is part of the total charge for transportation furnished by the carrier, and must be reasonable; and that when charges for refrigeration are applied in the transportation of perishable freight, such charges should be published and adhered to exactly as all other transportation charges are published and observed.

Have Railroad Rates Advanced?*

No one denies that for certain specific freight services the railroads now collect more than they would have received for carrying the same tonnage or the same articles between the same places in the year 1898. That this fact means that railroad charges are now actually higher than formerly is, however, open to serious question. Every one knows that the value of money, no less than that of commodities and services, is subject to fluctuation and comparisons of prices, wages or rates which leave these fluctuations out of the account are always defective and may be seriously misleading. Fluctuations in the value of money are measured by fluctuations in prices which are stated in terms of money. Reduce the prices of all commodities and services, giving each its proper weight, to general averages for successive years and these will express with precision the rise or fall in the value of the standard. The United States government has undertaken to do this, within practicable limits, through the Department of Labor and the movement of wholesale prices is portrayed by a series of index numbers compiled under the thoroughly competent direction of Carroll D. Wright. Comparing the yearly averages for all commodities with an average for the decade from 1890 to 1899 and stating the results as percentages the Department gives the following results:

Year.	Price.
1898...	93.4% of average for decade 1890 to 1899
1899...	101.7% of average for decade 1890 to 1899
1900...	110.5% of average for decade 1890 to 1899
1901...	108.5% of average for decade 1890 to 1899
1902...	112.9% of average for decade 1890 to 1899

In other words the purchasing power, with reference to commodities in general, of \$1.12 in 1902 was no more than that of 93 cents in 1898. One million dollars of railroad revenue in 1898 would have purchased as much in general commodities as \$1,208,779 in 1902. Of course the reverse of this would be true unless railroad rates, as stated in money, had advanced; that is, had there been no changes in the figures of the rate schedules the average quantity of commodities required to pay for a given transportation service would have been much less in 1902 than in 1898. As a matter of fact there have been changes in the railroad rate schedules and these have taken up a part of the reduction in the value of the money in which railroad charges are paid. By no means all of the reduction, however, has been offset in this manner. In 1902 it would have required \$1,208,779 to purchase as much in general commodities as \$1,000,000 would have bought in 1898, but for \$1,208,779 in 1902 the railroads would have carried 159,680,185 tons of freight or 60,865,005 passengers one mile, while in 1899 for \$1,000,000 they would have carried 138,121,547 tons of freight or 51,948,052 passengers the same distance. If these figures are clearly apprehended volumes could not tell more. They mean that in order to obtain the same command over commodities,

i.e., the same purchasing power, the railroads had to perform 15.61 per cent. more freight transportation and 17.17 per cent. more passenger transportation in 1902 than in 1899.

In the following table the receipts per passenger-mile and per ton-mile have been reduced to index numbers similar to those adopted by the Department of Labor and the results stated in parallel columns with the index numbers to which the Department has reduced wholesale prices.

Wholesale Prices and Rates Compared with Averages for the Decade from 1890 to 1899—Percentages.

Years.	Railroad Rates.		Wholesale Prices.			
	Passenger Rates.	Freight Rates.	Food, etc.	Cloths and clothing.	Fuel and lighting.	All commod- ities.
1890-99.	100.0	100.0	100.0	100.0	100.0	100.0
1890. . .	105.7	112.2	112.4	115.5	104.7	112.9
1891. . .	104.4	106.7	115.7	111.3	102.7	111.7
1892. . .	103.7	107.0	103.6	109.0	101.1	106.1
1893. . .	102.8	104.6	110.2	107.2	100.0	105.6
1894. . .	96.8	102.5	99.8	96.1	92.4	96.1
1895. . .	99.5	100.0	94.6	92.7	98.1	93.6
1896. . .	98.4	96.1	83.8	91.3	104.3	90.4
1897. . .	98.6	95.1	87.7	91.1	96.4	89.7
1898. . .	96.2	89.7	94.4	93.4	95.4	93.4
1899. . .	93.9	86.3	98.3	96.7	105.0	101.7
1900. . .	97.7	86.0	104.2	106.8	120.9	110.5
1901. . .	98.1	89.4	105.9	101.0	119.5	108.5
1902. . .	96.8	90.2	111.3	102.0	134.3	112.9

The foregoing shows that while the average price of each group of commodities was higher in 1902 than the average for the decade used as the basis both the passenger rates and the freight rates of the railroads were lower than the basis.

The price quotations used by the Department of Labor are secured from all sections of the country and are in 260 series representing an equal number of commodities. Separate comparisons with the ten-year average are given for each commodity and thus the price of every one of the 260 articles may be compared with railroad rates. Such comparisons show that the prices of all but 20 of the articles had advanced in 1902 to relatively higher figures than freight rates and those of all but 45 to relatively higher figures than those attained by passenger rates. The following table shows for each of the nine different classes of commodities the volume of railroad service which could have been purchased in 1902 by the sum which would have been realized in that year from the sale of a quantity sufficient, at the average prices and rates of the decade from 1890 to 1899, to have paid for, respectively, 1,000,000 passenger-miles and 1,000,000 freight-ton-miles.

1.—Passenger miles, purchasable in 1902 for quantity of commodity indicated sufficient to have paid for 1,000,000 passenger-miles at prices and rates of 1890-1899.

2.—Freight-ton-miles purchasable in 1902 for quantity of commodity indicated sufficient to have paid for 1,000,000 ton-miles at prices and rates of 1890-1899.

Classes of commodities.	1.	2.
Farm products	1,348,140	1,446,785
Food, etc.	1,149,793	1,233,925
Cloths and clothing.	1,053,719	1,130,820
Fuel and lighting.	1,387,397	1,488,914
Metals and implements.	1,210,744	1,299,335
Lumber and building materials.	1,227,273	1,317,073
Drugs and chemicals.	1,179,752	1,266,075
House furnishing goods.	1,159,091	1,243,902
Miscellaneous	1,178,719	1,264,967
All commodities	1,166,322	1,251,663

The foregoing shows that the same quantity of an average commodity in any of these groups would pay for from 5.37 to 48.89 per cent. more railroad transportation at the prices and rates in force during 1902 than at the average prices and rates of the years 1890 to 1899. These figures settle the question whether there has been an actual advance in railroad charges with a distinct and unquestionable negative.

Among the heaviest expenditures of the railroads, aside from wages, are those for fuel and rails. In the fiscal year 1902 the former item represented an expenditure of

\$120,074,192 and the latter one of \$16,952,102. Taking prices for George's Creek coal at the mines as the standard it appears that from 1898 to 1902 bituminous coal advanced 132.88 per cent. from 91.25 cents to \$2.125 per ton. During the same time steel rails increased in price 58.37 per cent. from \$17.625 to \$28.00 per ton. At the prices of 1898 the fuel and ties which cost, together, \$137,026,294 in 1902, would have cost but \$62,230,967. If the railroads paid for these two items of their necessary supplies out of their freight revenues the expenditures, at the rates and prices of 1902, represented the movement of 18,101,227,741 tons of freight one mile while at the rates of the fiscal year 1899 and the prices of the calendar year 1898 they would have represented but 8,595,437,431 ton-miles. If paid for out of passenger revenues the cost in service in 1902 was equal to carrying 6,899,611,984 passengers one mile as against 3,232,777,506 passenger-miles in 1899.

So far this paper has been restricted to the brief period of four years within which Mr. Prouty asserts that railroad exactions have added greatly to the burdens of the people. It has been shown that not only is this not the case but that within the period in question producers of all classes have seen their products increase in price as compared with railroad transportation so that the latter is now relatively cheaper than in 1898 or 1899, which is equivalent to saying that rates are lower than ever before.

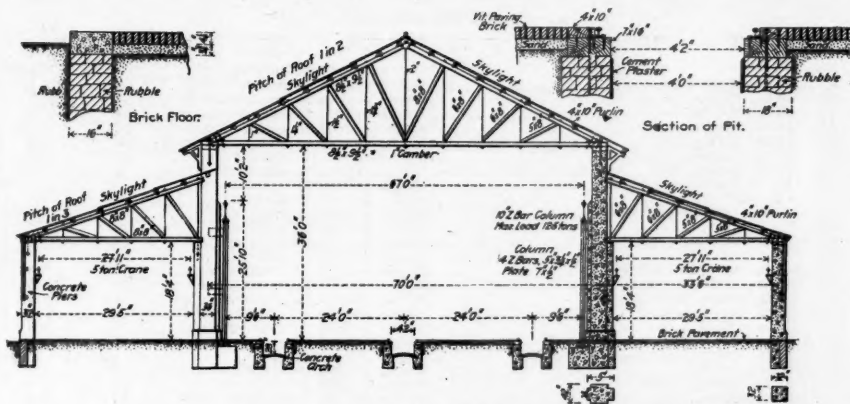
The only criticism of the statistics and arguments herein presented that is worthy of consideration is based upon the assertion that the passenger-mile and ton-mile units have been so modified by commercial changes that the revenue averages related to them no longer constitute a reliable indication of the changes in the general level of railroad charges. This criticism is as unsound as the contention which it is intended to support. The growing geographical concentration of industry and the increased importance of domestic manufactures, together with the augmented consuming power of the masses of the people which has been a direct consequence of unparalleled industrial activity, has given to the railroads an increasing proportion of high-grade traffic. The same causes have also resulted in enhancing the relative importance of local business. Westward-bound freight has for several years been far heavier in proportion to eastward-bound than ever before. All these things mean that there has been a decided rise in the quality of the ton-mile unit. In other words the payment per average unit is for a service of much higher and better quality than it was in the earlier years for which comparisons have been presented. Of course no one questions the improvement in the average unit of passenger service.

Compound Locomotives in France.

Mr. A. Mallet, the originator of a type of locomotive bearing his name, and well known the world over as a locomotive designer, in discussing the recent paper of M. Sauvage (see *Railroad Gazette*, April 8 and May 20, 1904,) calls attention to the part which he has had in the development of the modern four-cylinder balanced compound. He writes as follows:

He said that 25 years ago (June, 1879,) he read a paper on the compounding of locomotives, giving the results obtained in that way since 1876. The question was quite new at that time, and, so far as could be judged from the discussion that took place, the general impression amongst the members present at the meeting, save Mr. F. W. Webb, was that the subject offered but little probability of a definitive success. The author,

*Extract from a paper in *Guntion's Magazine*, by H. T. Newcomb.

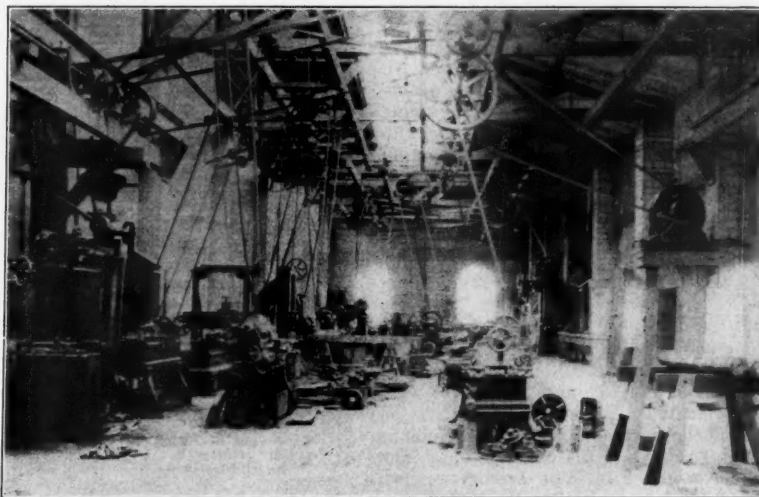


Section through Machine and Boiler Shop.

the erecting shop. Provision has been made for an extension of this building at both ends.

The construction of this building is quite different from any that has been illustrated recently, and is only possible in a climate that is not subject to cold. Both the roof and sides of the building are made of corrugated galvanized iron nailed directly to the purlins in the first case, and to stringers let into the columns in the second. Below this galvanized iron, the sides of the building are entirely open for 7 ft. 4 in. above the ground. The ends also are furnished with large door openings. These, together with the space between the roofs of side and center bays furnish a great deal of the natural lighting and all the ventilation that is necessary, and do away with the question of heating and ventilation which is so important in the United States. Further lighting is supplied by roof skylights of ribbed glass over all bays.

The ends and all columns of this building supporting the roof are of solid concrete built into place by using forms which were detached as rapidly as the concrete hardened. The columns supporting the runway girders of the large cranes are built up of 10 in. steel Z bars and anchored to the concrete columns at two different heights. The roof trusses are all of yellow pine. The machine



Typical Group Drive in Machine Shop.

and erecting shop has a floor made of vitrified brick laid on edge on top of a 3 3/4 in. layer of sand; the boiler shop has a dirt floor, tamped hard.

The engine pits are 24 ft. on centers and

wheels may be brought in to the wheel lathes.

The arrangement of machinery in the boiler and machine shop is shown in the illustration. The light machine tools are driven in groups from short line shafts by motors varying in size from 30 h.p. to 10 h.p. They are for the most part located at the south end of the shop in both the east and west bays, but there is also a group of light tools in the extreme northeast corner of boiler shop section, and the water service repair and tool room group. The heavy tools are all individually driven, and with the exception of the 84 in. quaternary machine and the 84 in. boring mill, are all old tools arranged for motor drive by the railroad. The four largest motors driving groups of tools, numbers 24, 25, 38 and 39 are supported on frames 7 ft. 6 in. high located against the columns of the building. By this arrangement the motors are not so exposed to dirt and injury as when placed on the floor, and at the same time are more accessible than if they were placed on the roof trusses. The smaller motors are placed overhead on the roof trusses, as in case of repairs they are lighter and can easily be lowered to the floor.

There are two tool rooms, one for boiler shop tools and a general tool room, which together with the room for the making of small brass parts and the air-brake repair room, are enclosed to prevent theft. The enclosing partitions consist of matched boards for a height of 4 ft. 0 in. above the floor, and wire netting of No. 11 wire, 1 in. mesh, above the netting, while permitting ventilation and entrance of light, effectually prevents stealing. In all the contract machine shops in Mexico City the employees are systematically

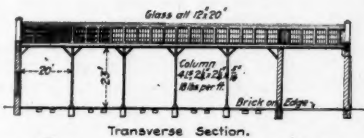


North End

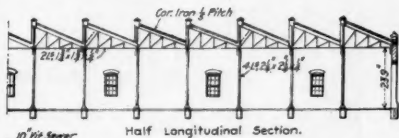


South End.

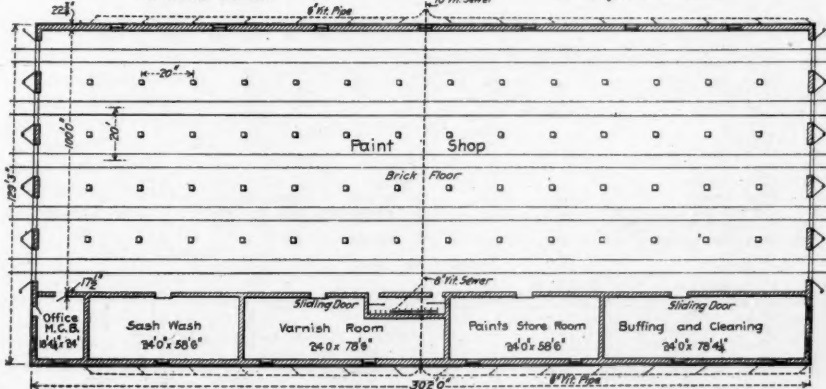
End Elevations of Paint Shop.



Transverse Section.



Half Longitudinal Section.



Plan and Sections of Paint Shop.

searched both when they leave at noon and night, this being the only way to prevent petty thieving. The railroad shops have not followed this practice and suffer in consequence. Frequently passenger cars are robbed of their brass journal bearings even when standing in the paint shop. Cast and malleable iron shells with a brass crown and heavy babbit lining have been used on freight equipment for a good many years in order to prevent the theft of solid brass bearings.

The accompanying table gives a list of the tools that are electrically driven and sizes of motors used.

The side bays are spanned by five-ton traveling cranes made by Maris Brothers, the east bay having one crane with a travel of 11 panels, and the west bay two cranes traveling 13 panels. The cranes have a span of 27 ft. 11 in. from center to center of runway rails, with bridges built of two 15 in. I-beams. The hoist is provided with both mechanical and electric brakes. Hoisting speed with full load is 15 ft. per minute. In addition to these light cranes the double punch and shear No. 92 and the large single punch No. 275 are each provided with jib crane and are operated by hand.

Spanning the center bay are two 60-ton, 4-motor electric traveling cranes made by the Niles-Bement-Pond Company. They are 76 ft. from center to center of runway rails and have a lift of main hook of 24 ft. Each crane is provided with a 10-ton auxiliary hoist.

Along both sides of the center bay are compressed air mains of 2½ in. pipe for half the length of the bay and reduced to 2 in. for the remainder. These air mains rest on the top anchors which hold the steel columns of crane runways to the concrete piers, and have outlets of 1 in. pipe extending down the side of each column in the boiler shop section and every other column in the erecting section. These outlets end in a standard Westinghouse hose coupling with an angle cock just above coupling. This permits an easy connection for hose leading to air hammers, drills, etc.

When an engine is brought in for heavy repairs, the tender is first disconnected and run in on the tracks leading to the tank shop and the engine is set on the center pit at the south end of the shop. As the engine is stripped the parts are placed on racks just east of the building. After stripping the 60-ton cranes lift the engine off the wheels and set it down on blocks on any one of the three pits. The wheels are put on the cross track by the crane and either run out east of the shop for storage or taken in at once to the wheel lathes. An engine is finished as much as possible at the place where it was originally set down by the crane. After the wheels are run under and connected up the engine is removed by the cranes to one of the side pits at the south end of the shop, receives its tender, is fired up, and run out on the yard tracks to be broken in.

The Coach Paint Shop.—This building which is shown in Fig. 2, was designed to be used as a coach paint shop only, but as the coach repair shop, located to the north of it, has not yet been built, it is at present used for both coach repair and paint shop. As a result, the capacity of the shop is somewhat overtaxed, as all the general coach repair and painting for the system is done here.

This building, 129 ft. 3 in. wide x 302 ft. long outside, is closed in completely to prevent the entrance of dust and is provided with a saw-tooth roof to get the necessary light, which enters from the north. The walls are of adobe, plastered, with brick

INDIVIDUAL MOTORS.

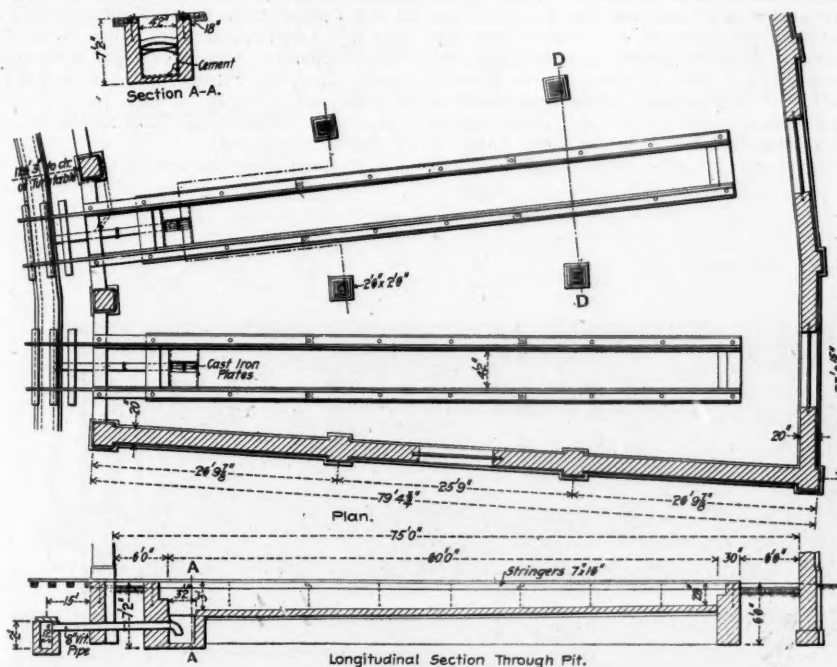
Tool No.	Description.	Method of Driving.	Motor No.	H-P. of Motor.
42.	42-in. Engine lathe	Motor geared to countershaft	36	2 V. 5
48.	48-in. Engine lathe	Motor geared to countershaft	37	2 V. 5
52.	48-in. Engine lathe	Motor geared to countershaft	34	2 V. 5
57.	48-in. Engine lathe	Motor geared to countershaft	33	2 V. 5
51.	51-in. boring mill	Motor geared to countershaft	85	2 V. 5
58.	48-in. Engine lathe	Motor belted to countershaft	35	2 V. 5
73.	60-in. Radial drill	Motor geared to countershaft	5	5
75.	No. 6 Sturtevant blower	Motor belted to countershaft	8	10
85.	Flue rattler	Motor geared to machine	12	10
92.	Double punch and shear	Motor geared to machine	74	10
93.	No. 3 shear	Motor geared to machine	29	10
94.	10-ft. bending rolls	Motor geared to countershaft	26	15
275.	No. 7 punch	Motor geared to machine	28	2 V. 15
98.	72-in. x 72-in. planer	Motor geared to countershaft	64	2 V. 10
99.	48-in. x 48-in. planer	Motor geared to countershaft	23	2 V. 10
102.	79-in. driver lathe	Motor geared to countershaft	11	2 V. 10
103.	79-in. driver lathe	Motor geared to countershaft	15	2 V. 10
104.	79-in. driver lathe	Motor geared to countershaft	13	2 V. 10
108.	Car wheel lathe	Motor geared to countershaft	2	2 V. 5
106.	84-in. quartering machine	Silent chain drive	1 and 40	3 each
107.	Wheel press	Motor geared to machine	17	5
109.	84-in. boring mill	Motor geared to machine	94	2 V. 10
180.	Axle lathe	Motor geared to countershaft	10	2 V. 5

*2 V. = two voltage.

GROUP DRIVEN.

Air-Brake Repair Room, Group "A."				
186.	Pipe cutter	Motor belted to lineshaft "A"...	9	5
4.	Air-brake repair machines on bench			
5.	17-in. engine lathe			
Brass Room, Group "B."				
6.	Fox brass lathe	Motor belted to lineshaft "B"...	32	5
7.	Brass miller			
8.	Fox brass lathe			
9.	Fox brass lathe			
10.	Fox brass lathe			
122.	12-in. sensitive drill			
Group "C" and "D."				
12.	Grindstone	Motor belted to lineshaft "C," which is connected by belt to lineshaft "D."	25	30
13.	15-in. shaper			
67.	No. 3 milling machine			
14.	12-in. shaper			
15.	Guide grinder			
16.	18-in. shaper			
17.	16-in. engine lathe			
18.	24-in. engine lathe			
19.	24-in. engine lathe			
20.	24-in. engine lathe			
21.	24-in. engine lathe			
22.	Forming lathe			
23.	Grindstone			
24.	24-in. engine lathe			
25.	Guide grinder			
26.	16-in. engine lathe			
Group "E" and "F."				
27.	Forming lathe	Motor belted to lineshaft "E," which is connected by belt to lineshaft "F."	38	30
28.	36-in. engine lathe			
29.	Stud lathe			
30.	17-in. engine lathe			
31.	17-in. engine lathe			
32.	17-in. engine lathe			
33.	12-in. engine lathe			
34.	17-in. engine lathe			
36.	Centering machine			
37.	17-in. engine lathe			
38.	16-in. engine lathe			
39.	Emery grinder			
41.	36-in. engine lathe			
42.	Bolt cutter			
43.	Bolt pointer			
45.	36-in. engine lathe			
46.	Grindstone			
47.	42-in. engine lathe			
40.	Oil separator			
Group "G."				
48.	20-in. shaper	Motor belted to lineshaft "G," which is carried by brackets bolted to columns and is below crane	30	10
50.	32-in. drill press			
51.	36-in. drill press			
54.	32-in. drill press			
55.	36-in. drill press			
56.	60-in. radial drill			
65.	3-in. spindle drill			
Tool Room, Group "H."				
44.	Yankee drill grinder	Motor belted to lineshaft "H"...	31	10
60.	32-in. drill press			
61.	Double wet emery grinder			
63.	R. & S. universal grinder			
66.	16-in. tool room lathe			
68.	B. & S. miller			
69.	24-in. engine lathe			
70.	32-in. drill press			
71.	12-in. shaper			
196.	Pipe cutter			
Group "J," "K" and "L."				
77.	30-in. drill press	Motor belted to lineshaft "J," which is connected by belt to lineshafts "K" and "L".....	4	10
78.	Flue cutter			
80.	Flue welder			
82.	Flue welder			
83.	Three-head bolt cutter			
84.	One-head bolt cutter			
89.	Stay-bolt swage			
Group "M" and "N."				
108.	12-in. slotter	Motor belted to lineshaft "N," which is connected by belt to lineshaft "M".....	24	30
110.	Grindstone			
111.	60-in. radial drill			
113.	16-in. engine lathe			
114.	16-in. engine lathe			
116.	30-in. x 30 in. planer			
137.	36 in. x 36 in. planer			
121.	36 in. x 36 in. planer			
35.	Centering machine			
123.	Grindstone			

		Group "O."	
124.	30-in. engine lathe.....	} Motor belted to lineshaft "O"....	39
125.	36-in. engine lathe.....		
126.	16-in. engine lathe.....		
127.	16-in. engine lathe.....		
129.	15-in. shaper.....		
130.	20-in. shaper.....		
131.	50-in. drill press.....		
132.	15-in. slotter.....		
11.	32-in. boring mill.....		
Horse power of all motors driving machine tools is.....			341
Horse power of crane motors.....			292½
Total horse power of all motors in building.....			633½

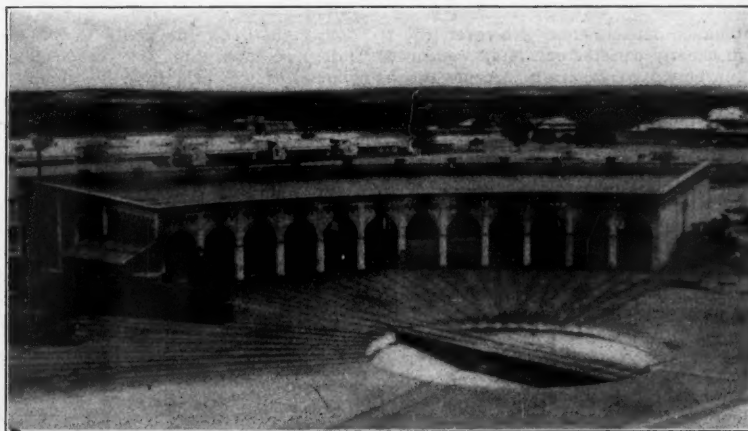


Part Plan of Roundhouse and Section through Pit.

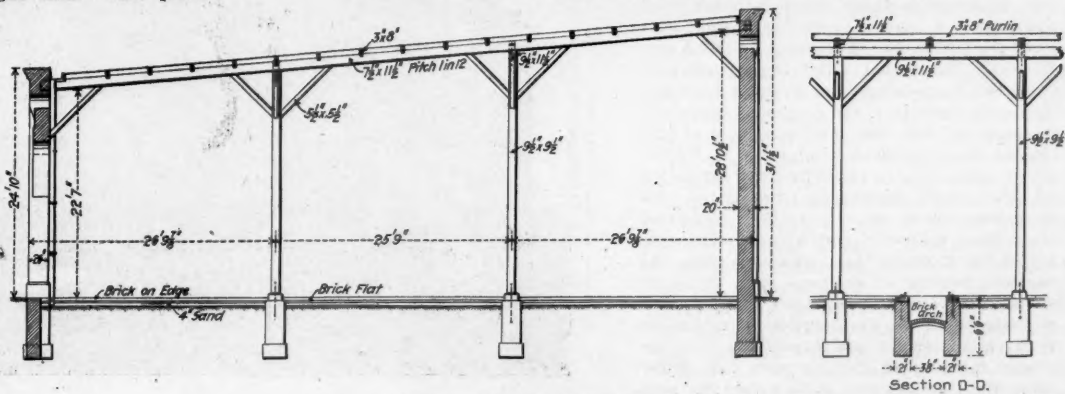
pilasters and brick trimmings around the windows and doors. The roof trusses and interior supporting columns are made of steel angles. The roof is of galvanized iron the same as all the other buildings. Five longitudinal tracks, spaced 20 ft. center to center, traverse the building and connect at both ends to the yard tracks. The floor is made of vitrified brick, set on edge and laid on 4 in. of sand. Rooms along the west side of the building are used for the Master Car Builder's office, sash washing, varnishing, paint storeroom, and for buffing and cleaning. These, of course, are at present used also by the coach carpenters, who will go to the coach repair shop as soon as it is built. At the north end of the paint store room for the distance of one panel, or 20 ft., a small room devoted to the manufacture of mineral brown paint is partitioned off. The iron ore is obtained in bulk, and is crushed, ground, sifted and mixed up into mineral brown paint for freight cars. This paint machinery is driven by a 10 h.p. motor,

No. 92

Roundhouse.—Provision has been made for a roundhouse with 56 stalls and one with 25 stalls, but at present only a section of the former containing 12 stalls has been built. The construction of this roundhouse is somewhat novel, all the walls being of concrete. The roof slopes towards the



Roundhouse—Company Houses and Hospital in the Background.



Section through Roundhouse.

center with a pitch of 1 in 12. It was originally made of galvanized iron but it did not take long for the gases from the engines to destroy this and it was relaid with 1 in. pine board covered with asphalt roofing paper. This has given complete satisfaction. Wood smoke-jacks are used and all the engines head into the house. In the walls just below eaves of roof are openings for ventilation and 8 ft. x 12 ft. windows are put in the outside wall in line with each pit. The entrances for engines are 12 ft. wide and 17 ft. 4 in. high. They are concrete arches resting on 2 ft. 2 in. square concrete columns. The pits are 60 ft. long in the clear with 12 in. added at each end for a step. Their side walls are of concrete with 7 in. x 16 in. stringers laid on top and anchored to them with $\frac{3}{4}$ in. bolts. The bottoms are brick arches and slope towards the center. The house is served by a 60 ft. turntable, designed and patented by C. L. Strobel, Chicago.

Discipline.*

On most of our railroads to-day the Division Superintendent is charged with the responsibility of conducting investigations and applying discipline; in this he is assisted by the Trainmaster. "Blue Monday" or "Court Day" is looked upon by the average employee with fear and trembling. He fears the result if he tells the truth, and he trembles, fearing that he may be found out if he does not tell the truth, so he approaches the Superintendent with the full determination of consolidating his feelings by telling as little as possible, and accepting the consequences. It is at this point where the average disciplinarian fails; not because he is not com-

*Extracts from a paper by J. B. Yohe, General Superintendent of the Pittsburgh & Lake Erie, read before the Railway Club of Pittsburg, May 27.

scientious in his efforts to do justice, not because he lacks the courage of his convictions, but rather because the truth is withheld, and he must render his decision upon circumstantial evidence. Where a board of inquiry is appointed to conduct investigations and apply discipline it usually consists of one officer from each department. It is thought that under this plan more facts are gleaned, and under the intelligent questioning of the examining board the employee is made to feel that if he tells the truth, the whole truth and nothing but the truth, he will receive justice. This system also has some objectionable features, the most notable being the disposition on the part of heads of departments to "saddle it onto the other fellow," and many a "Blue Monday" has been enlivened by a struggle between representatives of the transportation, mechanical and

then imposes discipline by actual suspension or dismissal, obtains the best results.

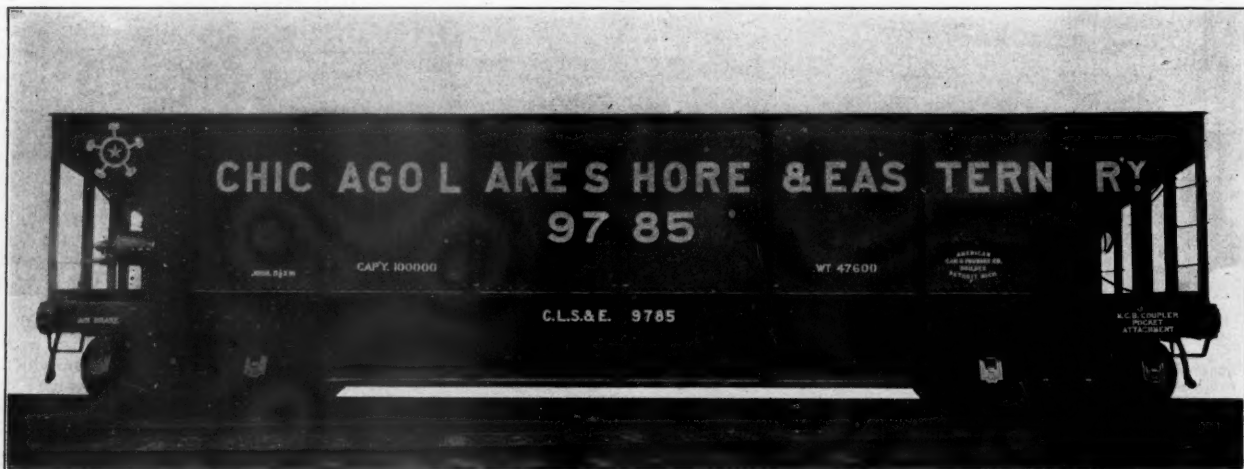
The greatest care should be exercised by the official charged with the duty of conducting investigations. He should be a man of wide experience in railroad service, one tireless in his efforts to secure all the facts in the case, willing to go over the ground personally, if necessary, so as to "put himself in the other man's place," and if, perchance he should discover that the one under suspicion has performed his duty to the best of his ability and understanding, he should not hesitate to overlook the offense, but first have a "heart to heart" talk with his man alone in his office, pointing out to him the effect of the accident on the reputation of his company, and on his own reputation as a railroad official. On the other hand, if, after a careful personal investigation it is

ing how he showed mercy to a soldier who had been sentenced to be shot for sleeping at his post.

100,000-lb. Coke Cars for the Chicago, Lake Shore & Eastern.

The Chicago, Lake Shore & Eastern has had in service for about a year a number of 100,000-lb. coke cars, which in design are similar in many ways to the steel coke cars of the Pennsylvania Lines West described a year ago (*Railroad Gazette*, June 26, 1903). The dimensions of these cars are somewhat smaller than the Pennsylvania car, being 40 ft. over end sills, 10 ft. high from rail to top of side, 39 ft. 10 in. long inside, and 9 ft. 3½ in. wide inside.

A distinguishing feature of the design is



Self-Clearing 50-Ton Coke Car, Chicago, Lake Shore & Eastern.

maintenance departments. However, the result is usually satisfactory to all concerned, and the employee generally accepts the decision of a board of inquiry with better grace than he would that rendered by any single individual, and there is also less liability of the case being appealed to a higher official.

All investigations, whether conducted by individual or board, should be fair and impartial, the decision reached should be based upon the evidence produced, and the sentence imposed without fear or favor, always, however, tempering justice with mercy.

Mr. Yohe then went on to refer to the merits of Brown's discipline, quoting from Mr. Brown's book on the subject, and continuing said:

A most thorough education on the part of employees as to the principle involved is absolutely necessary before the Brown system could be effectually introduced, and to properly educate on these lines railroad companies should have the training of their subjects from the day they enter railroad service. On roads that select their employees from the farm hands and country boys living along their line, the matter of education is comparatively easy, and any form of discipline, properly understood, could be intelligently enforced. On roads that are compelled to select their employees from those who have seen service on, or have been dismissed from other railroads, and who are also compelled to reinforce their numbers from the floating element of railroad men, many of whom place but little estimate on the value of their positions, the question of education is far more serious, and experience has convinced me that in dealing with this latter class, the manager who insists upon his men being given a fair and impartial trial, and

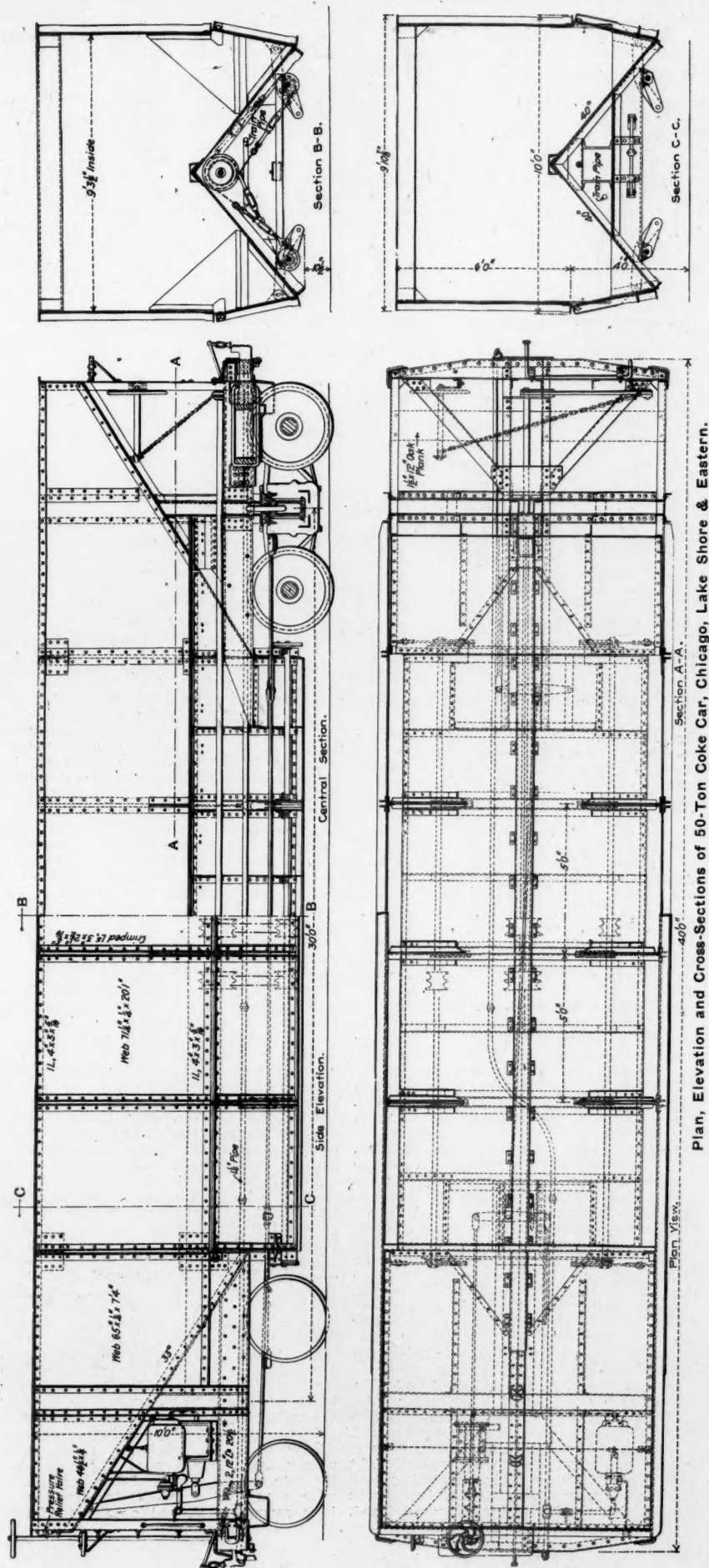
found that the one being investigated has misrepresented his case, made false statements, or withheld facts, he should be punished by actual suspension, or, if the circumstances warrant such a course, be dismissed. If extreme penalty is imposed it should be final.

The speaker ended by giving, as an example to be emulated, a specimen of the discipline dealt out by President Lincoln, tell-

ing the absence of continuous center sills. The floor supports the load as well as transmitting all buffing and pulling stresses. It is composed of ¼-in. web plates riveted at their adjoining edges to a 4-in. x 4-in. x ¾-in. angle, and to triangular frames of angles spaced 2 ft. 6 in. apart. The base member of these frames is a 3-in. x 3-in. x ½-in. angle, and the sides, which extend 1 ft. 1⅞ in. beyond the base, are 4-in. x 3-in. x ½-in.



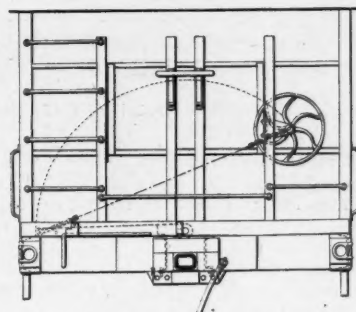
Operating End of Car, Doors Open.



angles. Connection to the side girders is made by gusset plates, three on each side, formed of two bent plates spaced 4 1/4 in. apart to provide an opening for the door-operating latch, and riveted along their upper edge to the top gusset which is a single plate.

The center sills are 12-in., 30-lb. channels, 12 ft. 4 in. long with flanges out. The inner ends are cut at an angle to conform to the slope of the floor and are tied together and to the floor by a sill plate 31 in. x 7/16 in. x 5 ft. 3 1/2 in. riveted to the bottom flanges and to the floor web plates. Bent plates are also riveted to the top flanges and to the apex angle of the floor. Transverse floor girders at each end of the door openings, formed of 12-in., 20-lb. channels, are riveted to the bottom flanges of the center sills.

The body bolster and support for the overhang of the hopper floor are combined in a deep box girder, as shown in the drawings. The web plates of the girder are bent at the top to fit the slope of the hopper, to which they are riveted, the inner plate having a bend sufficient to overlap the bend of the outer plate. One set of rivets passes through both plates and the hopper floor. Holes are cut through the webs for the center sills, to which the bolster is secured by bent plates. The bolster is stiffened over its center plate by two vertical Z-bars riveted to both webs and having two of their legs adjoining. Additional vertical stiffening is



Operating End.

End Elevation of 50-Ton Coke Car.

provided by angles spaced 2 ft. 4 1/2 in. each side of the center.

The end sills are 12-in., 20 1/2-lb. channels, with flanges turned in, and bent backward at a point 2 ft. 7 3/4 in. from each end to give an end displacement of 5 in. A top cover plate is riveted to the flange and is bent up 5 in. for riveting the end framing. The end sill is cut out at the bottom to a depth of 6 1/4 in. for the coupler shank, the opening being reinforced with straight and bent plates securely riveted to the channel web. Diagonal braces extend from the outer ends of the end sill to a connection with a plate riveted to the top flanges of the center sills just in front of the body bolster.

The side girders are tied together at the top with three channels, the one at the center being a 10-in., 15-lb. channel, and those on each side of it 8-in., 11 1/4-lb. channels. The doors are 19 ft. 11 1/2 in. long and 2 ft. 10 1/2 in. deep. The operating mechanism consists of a central shaft running the length of the car below the apex of the floor, with two sheaves on it near the center, around which chains pass to smaller sheaves on auxiliary shafts on opposite sides of the car near the bottoms of the doors. Fastened to each of these latter shafts are five latches, connected to the adjacent door. The form of these latches may be seen in the cross-sections. At one end of the car there is an arm on the central shaft, its normal position being horizontal. A chain passes from its outer end to a horizontal chain-shaft above it and on the opposite side of the car. Turning the

hand-wheel on this shaft winds up the chain, lifts the lever and opens the doors. A runway, made of a 7-in., 9½-lb. channel, with the flanges down, is placed above the apex of the floor, being supported by bent plates riveted to the latter. The cars have Westinghouse friction draft gear, Simplex bolsters and Barber trucks, and weigh approximately 47,500 lbs. Practically all of the material used is commercial shapes. There are 265 of the cars in service.

Although designed primarily for coke service, the car will handle coal, stone, iron ore

tion, consisting of five cars, ran to Monroeton, 12 miles, where it was turned on to a side track and ditched, notice having been sent to the agent by telegraph. The middle portion, consisting of 12 cars, was thrown off the track as it crossed the bridge over Schrader's Creek, near Barclay, and with the bridge, which was a wooden one, fell to the creek below. The engine and three cars, following, approached the bridge too fast to be stopped, and plunged into the wreck at the bottom of the creek. The men on the engine jumped off and saved themselves.

bc, 2nd, Minneapolis, St. Paul & Sault Ste.

two cars. One passenger was killed and two were injured, one of them fatally. The southbound train had run only about a quarter of a mile from its starting point. The northbound train had disregarded a telegraphic meeting order. At the inquest the engine man admitted that he confused two orders. "He said he merely glanced at them, thinking the customary instructions regarding train 901 were in the order." When nearing Frankford, however, the brakeman asked to see the orders and pointed out the mistake. The air-brakes were then put on, but it was too late. Another witness at the inquest said the two men would not have lost their lives if they had not jumped from the car. The jury refrained from censuring the conductor and engineer, who had already been punished by dismissal.

†5th, Colorado Springs & Cripple Creek District, Cameron, Colo., the rear car of a passenger train, which became uncontrollable while being switched, ran some distance to a curve, where it was overturned and wrecked. Three passengers were killed and 60 were injured.

unf, 5th, Chicago, Peoria & St. Louis, Oakford, Ill., a passenger train was struck by a cyclone and the cars were lifted off the track and tumbled down a bank. The baggage man was killed and 12 passengers and three employees were injured.

*eq, 6th, Chicago & North Western, Woodbine, Iowa, a freight train was suddenly stopped by an automatic application of the air-brakes, due to some defect, and two cars were thrown off the track and fell across the rails of the adjacent track. A freight train on the latter track ran into the wreck. The broken cars at once took fire and 17 of them, with their contents, were burnt up. One man was killed and two others were injured.

unf, 7th, Ohio Central, Bellefontaine, Ohio, a freight train was derailed by running into a washout, and the engine and five cars fell into a creek. Five trainmen were injured.

xc, 8th, 11 p.m., Wabash road, Detroit, Mich., collision of passenger trains running at low speed, one of the trains running backward. One sleeping car was overturned. Two passengers were injured.

8th, Atchison, Topeka & Santa Fe, Mendon, Mo., mail train No. 7 was derailed at a point where the track had been weakened by rain, and the tender, four baggage cars and one mail car fell down a bank. Two trainmen and one trespasser were injured.

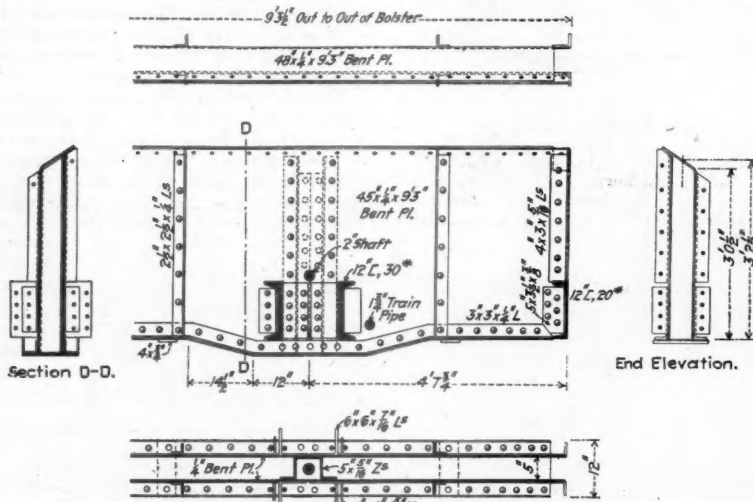
unx, 9th, Raleigh & Cape Fear, Raleigh, N. C., a passenger train was derailed and one car was overturned. Forty passengers were injured, most of them slightly.

†rc, 10th, 10 a.m., Erie road, Midvale, N. J., a special excursion train standing at the tank was run into at the rear by a following regular passenger train, crushing the rear car of the standing train and damaging the engine and several other cars. Sixteen passengers were killed and more than 60 were injured. The point at which the collision occurred was only 470 ft. beyond a block signal which, it appears, had not been thrown to the stop position after the passage of the special train and therefore indicated "all clear" to the following train. The investigation developed the fact that the flagman of the standing train was out only a very few car lengths. He had an opportunity to go back a much greater distance.

10th, Missouri Pacific, Labadie, Mo., an excursion passenger train was derailed and two passenger cars were thrown down a bank, turning over twice before they reached the bottom. Two other cars were also derailed and 17 passengers were injured. It is said that a wheel of the tender rode the point of a switch.

unx, 12th, Cincinnati, New Orleans & Texas Pacific, Oakdale, Tenn., passenger train No. 3 was derailed and one trainman was killed.

†13th, 8 p.m., Chicago & Eastern Illinois, Glenwood, Ill., a northbound excursion passenger train, running on the southbound track to get around an obstruction, collided with a part of a freight train which had been moved southward on the southbound track, contrary to orders, and the first three cars of the excursion train were crushed. Eighteen passengers were killed and 25 or



Detail of Body Bolster for 50-Ton Coke Car.

and other similar coarse freight to advantage. For capacity loads of coke, racks 24 in. high are provided. In testing the car for time of unloading, 49 tons of coke were dumped in 45 seconds. With coal and stone, capacity loads were dumped in one to one and a half minutes. Wet ore, which adhered to the sides of the car and was heavy, took a maximum time of eight minutes. One of the cars was in an accident and received a blow severe enough to break the sills at the end and damage the draft rigging. The floor stood the shock without apparent injury.

Train Accidents in the United States in July.¹

dn, 1st, Norfolk & Western, Kenova, W. Va., a freight train became uncontrollable on a steep descending grade and ran off the track, demolishing two boarding cars and injuring 12 workmen who were in the cars.

dn, 1st, Susquehanna & New York, Laquin, Pa., a string of 19 cars of logs and one car containing a log loader were bumped by a string of three empty cars, and, becoming uncontrollable on the steep grade, ran at high speed toward Towanda. After running a short distance the string of cars broke into three parts and the last part, consisting of the three empty cars, was overtaken by an engine which pursued them. The front por-

Marie, Tony, Wis., westbound passenger train No. 7 ran into an eastbound freight train, badly damaging both engines, three freight cars, one baggage car and one mail car. A postal clerk and two tramps were killed, and the engine man, three trainmen and 12 passengers were injured.

eq, 2nd, Pennsylvania road, Roxburg, N. J., a freight train was derailed by a broken axle and 20 cars were thrown down a bank and wrecked. Two trainmen were killed.

bc, 3rd, 8 p.m., Chicago, Burlington & Quincy, Lytle, Wis., butting collision between a stock train and a switching engine, wrecking both engines and several cars. The engine man of the switching engine was killed. It is said that this engine had run past a train order signal set against it.

unf, 3rd, 5.36 p.m., Wabash road, Litchfield, Ill., a southbound passenger train running at full speed was derailed at a misplaced switch, and the engine, baggage car and first three passenger cars were wrecked. The engine was turned completely around, and the combination baggage and smoking car was stood upon end. A number of freight cars on a side track were knocked over and demolished. The wreck took fire at once and seven of the nine cars in the train were burnt up. Twenty-one passengers and three employees were killed and 45 passengers were injured, the bodies of some of the killed being destroyed by fire. The coroner's jury which investigated the wreck reported that the switch had been disconnected from its stand, and the officers of the road have no doubt that it had been tampered with. The last preceding train (a passenger train) had passed it only about 40 minutes before the disaster, and the switch had not been used in the intervening time.

rc, 5th, Ruffin, N. C., fast mail train No. 97 ran into the rear of a preceding work train, damaging the engine and wrecking two freight cars. The fireman was injured.

bc, 5th, Wisconsin Central, Rugby Junction, Wis., butting collision between a freight train and an empty engine, wrecking both engines and several cars. One trainman was killed and four other trainmen were injured.

†bc, 5th, Philadelphia & Reading, Frankford, Pa., butting collision of passenger trains, wrecking both engines and damaging

¹Accidents in which injuries are few or slight and the money loss is apparently small, will as a rule be omitted from this list. The official accident record published by the Interstate Commerce Commission quarterly is regularly reprinted in the Railroad Gazette. The classification of the accidents in the present list is indicated by the use of the following

ABBREVIATIONS.

- rc Rear collisions.
- bc Butting collisions.
- xc Miscellaneous collisions.
- dr Derailments; defect of roadway.
- eq Derailments; defect of equipment.
- dn Derailments; negligence in operating.
- unf Derailments; unforeseen obstruction.
- unx Derailments; unexplained.
- o Miscellaneous accidents.

An asterisk at the beginning of a paragraph indicates a wreck wholly or partly destroyed by fire; a dagger indicates an accident causing the death of one or more passengers.

more injured, most of them being members of a Sunday school, for which the excursion was run. This collision was reported in the *Railroad Gazette* of July 22 and August 5. At last accounts Engineman Hoxie, who moved the freight cars, could not be found. He disappeared within a day or two after the collision.

13th, Cleveland, Cincinnati, Chicago & St. Louis, Sharon, Ohio, the engine and several cars of a freight train, while crossing a bridge on a side track, broke through the bridge and were wrecked. The fireman and one brakeman were killed and the engineman was severely scalded.

13th, Louisville & Nashville, Crestview, Fla., a freight train which had become uncontrollable on a steep descending grade was derailed, apparently by the breaking of the flange of a wheel of the engine, and the whole train, consisting of the engine, nine cars of lumber, and a caboose, was ditched and wrecked. One brakeman was killed and the engineman, fireman and conductor were injured.

13th, Chicago, Rock Island & Pacific, Havana, Ark., eastbound passenger train No. 2 was derailed and broke through a bridge, the mail car and smoking car falling to the creek below. Eight passengers and four trainmen were injured.

unx, 14th, Grand Trunk, Gorham, N. H., an eastbound passenger train was derailed and the engine and four cars fell down a high bank. One passenger, three trainmen and a mail agent were injured, the latter fatally.

unx, 14th, Southern Railway, Fayette, Ala., a passenger train was derailed and broke through a trestle bridge, the engine and first two cars being overturned. The engineman and fireman, mail clerk and express messenger were injured.

rc, 15th, Bessemer & Lake Erie, Fredonia, Pa., a special train ran into the rear of a preceding freight train; the superintendent of the road and two other men were injured.

unx, 15th, Atlantic Coast Line, La Pine, Ala., a pay car train was derailed, and one employee was killed.

bc, 15th, 5 a.m., Pennsylvania road, Shippen, Pa., butting collision between northbound passenger train No. 107 and southbound freight train No. 152, badly damaging three locomotives and wrecking the baggage car. Two firemen were killed and several other trainmen were injured. The freight had passed from double-track to single-track without right, the engineman having failed, in a dense fog, to keep a good lookout for the stopping place. He stopped soon after passing the switch but not soon enough to prevent the collision.

unf, 16th, Eastern Texas, Druso, Tex., a passenger train was derailed at a point where the track had been weakened by heavy rains, and two passenger cars were overturned. One passenger was killed and two were injured, one of them fatally.

unx, 17th, Pennsylvania road, Portageville, N. Y., an excursion train was derailed and a tool house near the track was demolished by the derailed engine. Four passengers were injured.

unx, 17th, Southern Railway, Edmunds, S. C., a freight train running at high speed was derailed and several cars of fruit were wrecked. One brakeman was killed and another injured.

unx, 17th, Gulf, Colorado & Santa Fe, Dallas, Tex., passenger train No. 67 was derailed and eight of the nine cars in the train were ditched, two of them being wrecked. Of the 400 passengers on the train, only six were injured. The brakeman in the baggage car was crushed by an iron safe.

unx, 18th, Illinois Central, Cold Springs, Miss., southbound passenger train No. 1 was derailed and four of the five passenger cars were overturned and fell down a bank. The conductor and 10 passengers were injured, one of them fatally.

dn, 18th, Boston & Maine, Portsmouth, N. H., an engine and five freight cars ran off the track at an open drawbridge and fell into Piscataqua river. Four trainmen fell into the stream and one of them was injured.

dn, 19th, Chicago & North Western, Stan-

wood, Iowa, an eastbound passenger train was derailed by a misplaced switch, badly damaging the engine and four cars and a building near the track. The engineman and fireman were killed and four other persons were injured.

bc, 22nd, Baltimore & Ohio Southwestern, North Vernon, Ind., a passenger train ran over a misplaced switch and into the head of a freight train standing on the side track, damaging both engines. One fireman was killed and three other trainmen were injured.

unf, 22nd, Central of Georgia, Statesboro, Ga., a freight train was derailed by sand which had been washed upon the track at a crossing and three train men were injured.

bc, 22nd, Chesapeake & Ohio, Blue Sulphur Springs, W. Va., rear collision of freight trains, damaging the engine and four cars. Three trainmen were injured. The leading train had been suddenly stopped, and the following section, ordered to run at cautionary speed, appears to have been following too closely.

unf, 22nd, Southern Railway, Franklin, Va., passenger train No. 9 was derailed by a car door which had fallen from a freight train and lay across the track. The engineman and fireman and a flagman riding on the engine were killed and the baggageman was injured.

eq, 23rd, Atchison, Topeka & Santa Fe, Kinsley, Kan., eastbound passenger train No. 6 was derailed by a brake-beam of the mail car which fell to the track. The express car and one passenger car were ditched. The express messenger was killed and several other persons were injured.

23rd, 11 p.m., Pennsylvania road, Atglen, Pa., an eastbound freight train on track No. 1 collided with a part of a westbound freight train which was switching on the main track, damaging both engines and several cars. A moment later a second eastbound freight train on track No. 2 ran into the wreck. Altogether three engines and 15 cars were spread across the four main tracks.

bc, 25th, Pennsylvania road, Delavan, N. Y., butting collision of freight trains, wrecking both engines and 20 cars. One engineman, one fireman and one brakeman were killed, and one engineman was injured.

26th, 3 a.m., Southern Railway, Boydton, Va., a passenger train was derailed by spreading of rails, and the tender, baggage car and two passenger cars were overturned. Ten passengers were slightly injured.

dr, 26th, Southern Railway, Jonesboro, Tenn., a freight train was derailed by spreading of rails and ten cars and two new "dead" locomotives were badly damaged. The man in charge of the new locomotives was badly injured and four trainmen less severely hurt.

26th, Baltimore & Ohio, Banning, Pa., a passenger train was derailed by a defective rail or switch and the dining car was overturned. Three passengers and two employees were injured.

eq, 27th, Chicago, Rock Island & Pacific, Godfrey, Colo., passenger train No. 5 was derailed by the breaking of an axle of the baggage car, and four passenger cars were overturned. Although the train was running at 35 miles an hour, it is said that the passengers in the overturned cars did not go into a panic, and only six of them were seriously injured.

trc, 28th, St. Louis, Kansas City & Colorado, Jeffriesburg, Mo., rear collision of passenger trains; one passenger was killed and two were injured.

unf, 28th, Great Northern, Leavenworth, Wash., a freight train was derailed by a rock which had fallen upon the track, and the engine was ditched. The engineman was killed.

bc, 29th, Pennsylvania road, Sharpsville, Pa., butting collision between a passenger train and an empty engine, wrecking both engines and the foremost passenger car, which was next to the tender. The engineman of the passenger train was killed and the fireman fatally injured. Three other trainmen were injured. The empty engine was running on the time of the passenger without orders.

rc, 30th, Cincinnati, Hamilton & Dayton, Russellville, Ind., a heavy freight train as-

cending a grade was run into at the rear by a following light freight train. A fireman (off duty) was killed.

rc, 30th, St. Louis & San Francisco, Beaumont, Kan., a freight train ran into the rear of a preceding freight, wrecking the engine, caboose and two cars. The engineman was injured.

xc, 31st, 11 p.m., New York, New Haven & Hartford, New Haven, Conn., an eastbound passenger train collided with a freight train which was backing onto a side track, damaging the engine and several freight cars and throwing the passenger engine down a bank. The engineman was killed and the fireman injured.

31st, Glover, Ill., a freight train of the Chicago & Eastern Illinois ran into a freight of the Peoria & Eastern at the crossing of the two roads, wrecking several cars and ditching the engine.

unx, 31st, Louisville & Nashville, Boyles, Ala., a freight train was derailed and nine cars were ditched. One brakeman was killed.

A Third-Rail Electric Heating System.

BY WILLIAM GREENOW, JR.

The formation of ice on the third rail is due to the difference in temperatures between the third rail and the atmosphere. As all metals are slow to respond or conform to these sudden changes, it is but natural that rain or moisture falling upon a thoroughly chilled rail, will quickly freeze and form a hard coating of ice, which is difficult to remove mechanically. This coating of ice, being an insulation of high resistance, effectively prevents the current from flowing to the collectors or shoes of the motor car, until the temperature of the rail rises above the freezing point.

To remove this coating of ice, many mechanical appliances, such as wire brushes and scrapers, have been employed, but without complete success, except in such instances where specially constructed scrapers or blades were brought to bear with enormous pressure upon the third rail. These pressures have been found to be prohibitive, however, as they not only damage the third rail by repeated cuttings, but also impair the stability of the insulator mountings.

The only effectual way to remove and even prevent these ice coatings is to heat the third rail by means of electricity. Plans have been suggested requiring a special form of rail section or a complication of connections and apparatus for the conversion of the electric current. No regard, however, has been given to the cost of these electric heating systems nor to their applicability to the T sections of third rail now in use.

The writer has devised a method which is applicable to the T rails now in use, whereby the temperature of the third rail can be quickly raised a number of degrees above the surrounding air, with an economical use of current.

The steel heating wire extends along the length of the third rail, from which it is insulated by porcelain bushings. It is securely held in position close under the rail head by wood strips, which also extend along both opposite sides of the rail, enclosing it. One end of the heating wire is directly connected to the third rail, while the other end is connected to the ground by a switch provided with a magnetic blow-out break and which may be operated electrically from any point to close and open the heating circuit. This heating wire is also provided at intervals with tubular, telescoping joints, which permit of its expansion and contraction, when heating and cooling. The wood strips serve to shield the rail from the wind and also to maintain the temperature of the rail when raised for a greater length of time.

The following data, proving the feasibility

of this system, was obtained from a series of tests made in the car yards of the Connecticut Railway & Lighting Company at Bridgeport, Conn., on different days during February and March, 1904, on a 70-lb. T rail, 30 ft. long, to which one heating wire was mounted in the manner already described. This wire was connected in series with a water barrel rheostat for purposes of test, showing clearly that the amount of current consumed by the rheostat and wire is equivalent to the amount of current consumed by a similar wire, half a mile long, heating a half mile of third rail.

slabs of loose ice placed upon the rail would quickly melt and drop away.

It is safe to assume that, by employing two heating wires, one each side under the rail head, requiring, however, twice the amount of current, the above results can be obtained in nearly half this time. After the current was cut off from the heating wire the temperature of the rail would continue to rise, after which it would be very slow in dropping back to its former normal condition, due no doubt to the protection afforded by the wood strips enclosing its web or sides. For obtaining correct rail tempera-

an approximate current consumption of 45 to 90 k.w., respectively, and which, at two cents per k.w. per hour, for, say, 15 minutes, will represent an approximate cost of 23 cents for the removal of ice from one-half mile of third rail, and 46 cents for one mile. Greater unit lengths of heating wire than one mile would not be well or safe to recommend, the size or diameter of the wire reaching its maximum for that length owing to the limited space wherein it can be insulated and enclosed under the rail head.

This system may be applied and mounted to any T rail section without drilling holes in rail. The present rail-joint plates in use can be exchanged or replaced by a special form having a channel or groove for the reception and enclosure of the heating wire. The heat radiating from the wire is not so great as to char or discolor the wood groove, though in practice this groove could be lined with asbestos cement, which can be thickly applied with a brush before placing and securing the wood strips in position.

Railroad Shop Tools.

(Continued.)

HORIZONTAL DRILLING AND BORING MACHINES.

This type of machine is considered by many to be next to the lathe in usefulness. It is used for horizontally boring, drilling and facing, and is adapted to a great variety of work. Cylinders may be bored, faced on the flanges, drilled and tapped for studs with but one setting. Valve seats can be milled off and the ports cut out, while for driving boxes and other bearings a machine of this kind is very useful. The construction of these machines is such that work can be set rapidly and with ease. Owing to the different uses that these machines are put to it

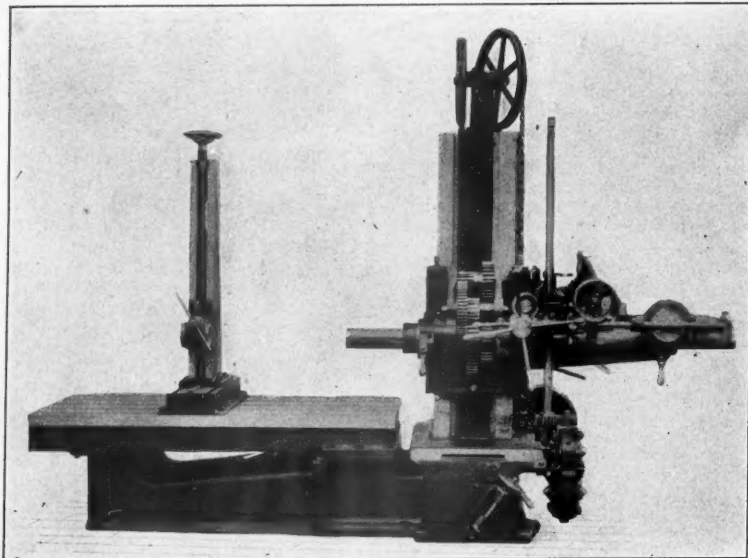


Fig. 1—The Fosdick Horizontal Boring and Milling Machine.

This rail was kept outdoors, where it was exposed to the weather under conditions similar to any installed third rail. The temperature of the air ranged from 15 deg. to 31 deg. F. during the tests. At times water was poured over the rail the night before to produce a thick coating of ice, for purposes of demonstration the following morning. I was assisted in making these tests by Messrs. W. T. Oviatt, Electrical Superintendent, and R. B. Davis, both engineers of the above railway company. The averages taken from all tests give: Temperature of air, 23 deg. F.; current consumed, 90 amperes at 500 volts pressure; time in which ice was melted, 12 to 15 minutes; rise in temperature of rail above 32 deg. F., 2 deg. to 19 deg.

When the temperature of the air was 15 deg. F., the temperature of the rail would in 15 minutes be raised to 34 deg. F., and 2 deg. above freezing, when melting of the ice would occur. This condition, however, is not a natural one and will not occur in practice, but serves to demonstrate the efficiency of the system and to what extent the temperature of the rail can be raised within the stated time. Again, when the temperature of the air was 31 deg. F., the temperature of the rail would be raised in 12 minutes to 50 deg. F., or 18 deg. above freezing. The temperature of the one heating wire employed in these tests was about 475 deg. F., according to calculations, consuming an electrical energy of 45,000 watts.

It was noticed that almost regularly within eight minutes after the heater circuit was closed the ice would crack and loosen from the rail, when it could be readily pushed off, and, four to seven minutes later at the end of 12 or 15 minutes' closed circuit, the ice would entirely disappear. Even thick

ture readings, the thermometer bulb was inserted in a hole drilled in the rail head; this hole was filled with quicksilver, to afford good metallic conductance to the bulb. A test tube was then slipped over the thermometer to exclude it from the air.

With this system I propose to heat half mile and single mile lengths of third rail with a continuous heating wire of corresponding unit length and resistance, whereby the temperature of the wire may be maintained between 450 and 500 deg. with

is important that they should have a wide range of speed and feeds. Although a number of builders make this type of machine, the general design is about the same, the several designs differing principally in size and in the details of construction.

The horizontal boring, drilling and milling machine, shown in Figs. 1 and 2, is made by the Fosdick Machine Tool Company, Cincinnati, Ohio, and is used for boring, drilling, reaming, facing, milling, etc. The machine is driven by a splined shaft which trav-

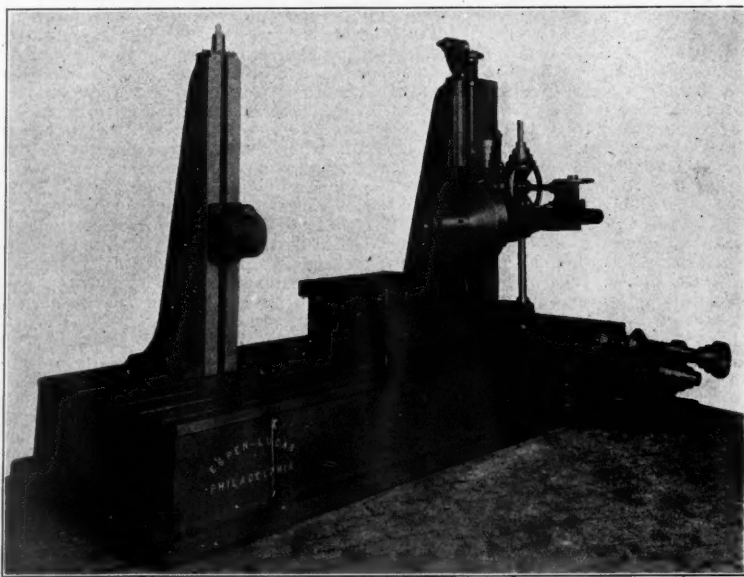


Fig. 3—The Espen-Lucas Horizontal Boring, Milling and Drilling Machine.

erses the driving cone on the rear of the bed. The column carrying the spindle head has a horizontal movement on the bed by hand or power in both directions; also a quick forward and return motion by power operated by the handwheel on the front of the bed. The spindle head, which is counterbalanced and fitted with a safety chain, has a vertical movement on the column by hand or power in both directions, and for quick adjustment is operated by means of the pilot wheel on the front of the spindle head. The spindle runs in adjustable bronze bearings and has a thread cut in its front part to receive chucks, large milling cutters, facing heads, etc. It revolves in right or left hand directions and can be started, stopped or reversed instantly. The spindle bar, which passes through the spindle, is 4 in. in diameter, has 22 in. traverse and is fitted with a No. 5 Morse taper. It has power and hand feed in both directions. is operated from the pilot wheel for quick adjustment and can be securely

table in which the T slots are planed is stationary and bolted to the bed and base, insuring perfect alignment of the work. The horizontal feed of the column and of the spindle bar and the vertical feed of spindle head, are taken from the spindle. The feeds are positive geared and are eight in number. All feeds are reversible and can be operated by either hand or power, and are arranged in geometrical progression from .007 in. to $\frac{1}{4}$ in. per revolution of the spindle. The

the end of the spindle to the end of the bed is 12 ft. 6 in. The total height of the machine is 8 ft. and the net weight is 12,000 lbs.

The accompanying illustration (Fig. 3) shows the horizontal floor boring, milling and drilling machine made by the Espen-Lucas Machine Works, Philadelphia. This tool, while it conforms in its principal features to the more expensive and larger machines, is able to do the boring and a large amount of the milling heretofore necessarily done on the long milling machine. It covers a wide range and a great variety of work, being applicable to all kinds of boring, tapping, reaming and milling, such as key-seating long, heavy shafting in short places, which operation otherwise requires a larger machine. It can be used for face milling, with a rotary cutter head like a rotary planer, and will do all kinds of end milling and can be used for cotter drilling and cutting key-seats with end mill. Large castings can be placed on the platen and all work finished with but one setting.

The spindle, which is made of hammered crucible steel, is 4 in. in diameter and feeds through a gun metal sleeve. The boring bar has 24 in. feed, and has a No. 6 Morse taper hole in the end, also a pin hole for retaining the bars and milling tools in place. The head has a vertical adjustment of 30 in. and can be clamped in any position for milling. The column carrying the spindle head has automatic feed and quick return in both directions, giving a 42 in. horizontal movement to the spindle head for milling. The spindle has feed in either direction for boring and counterboring both ends of cylinders. The spindle is geared for heavy work and has a five-step cone, which gives 80 changes

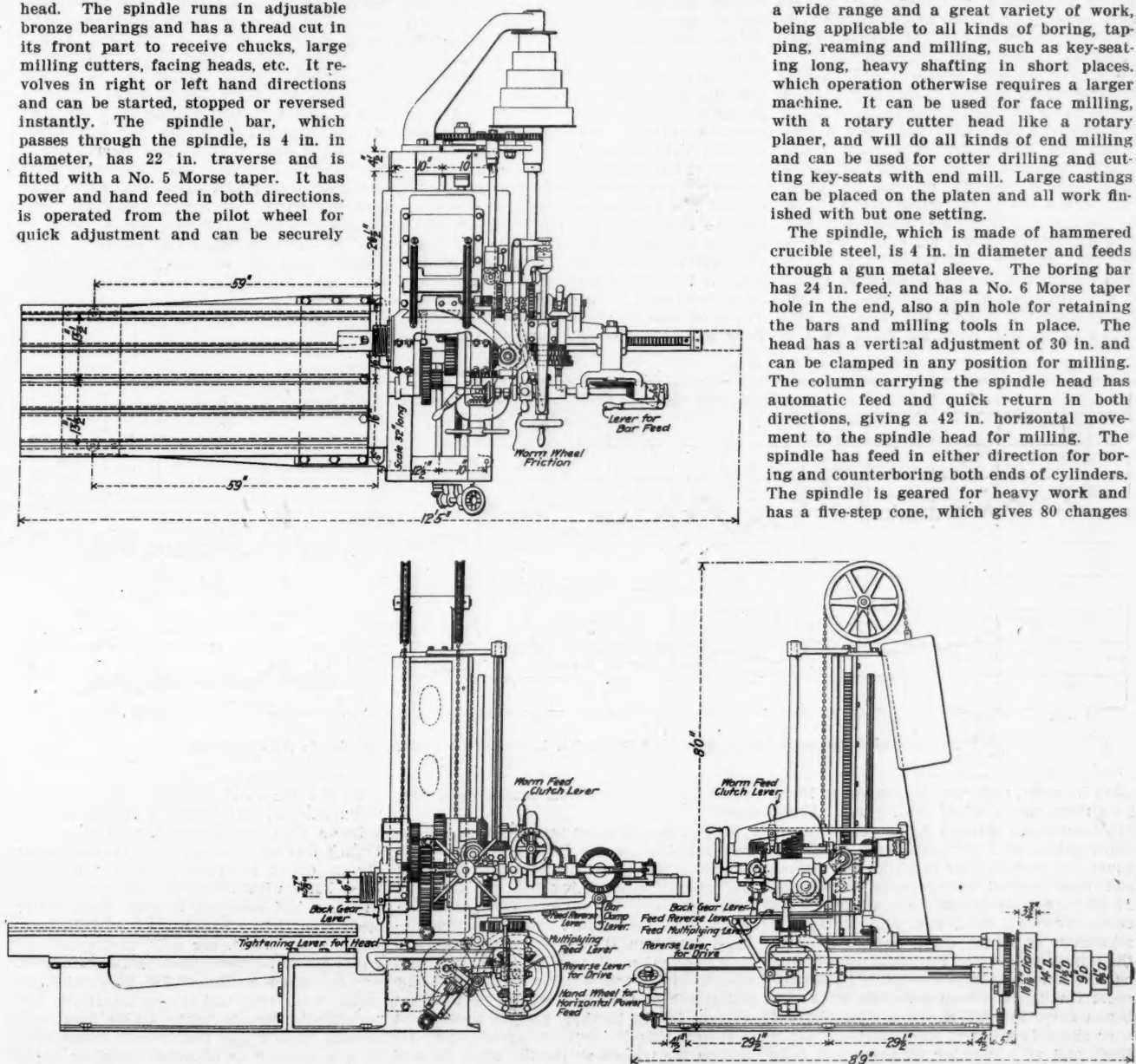


Fig. 2—The Fosdick Horizontal Boring and Milling Machine.

clamped for face milling purposes. The back gears are on the spindle head, bringing the power direct to the work, thus relieving the outer shafts from unnecessary strain, and also reducing the vibration of the cutting tools to the minimum. The lever for operating the back gears is on the spindle head. These gears can be engaged or disengaged while the machine is running. The outer support for the boring bar can be clamped securely to the table and has horizontal and vertical adjustment. It is provided with graduated steel rules, as is also the face of the column and the bed, and the spindle sleeve is also graduated. The

spindle speeds are ten in number, arranged in geometrical progression from 4 to 260 r. p.m. The gear ratio from the cone driving shaft to spindle is $2\frac{2}{3}:1$; that is, when the driving shaft makes $2\frac{2}{3}$ revolutions, the spindle makes 1. The ratio of back gears is 13.6:1. All of the bearings are bushed with bronze. The bevel and miter gears are all planed from the solid. The maximum distance from the table to the center of the spindle is 44 in. The minimum distance is 8 in. The table is 31 in. x 72 in., and the distance from the top of the table to the floor is 22 in. The column has a horizontal adjustment on the bed of 32 in. The distance from

of feed and 20 changes of speed. The gearing is made of steel, cut from the solid, and the bearings are all lined with bronze. The machine can be built with plain or compound table, or with both. The platen is 42 in. x 84 in. The tail support is built with or without a horizontal adjustment. Adjusting screws and micrometer adjusting dials are also attached, if required. The countershaft is arranged so that the spindle can be run in either direction. The length and width of the table and also the length of movements in all directions can be increased to suit requirements.

(To be Continued.)

The Growth of the Missouri Pacific.—II.

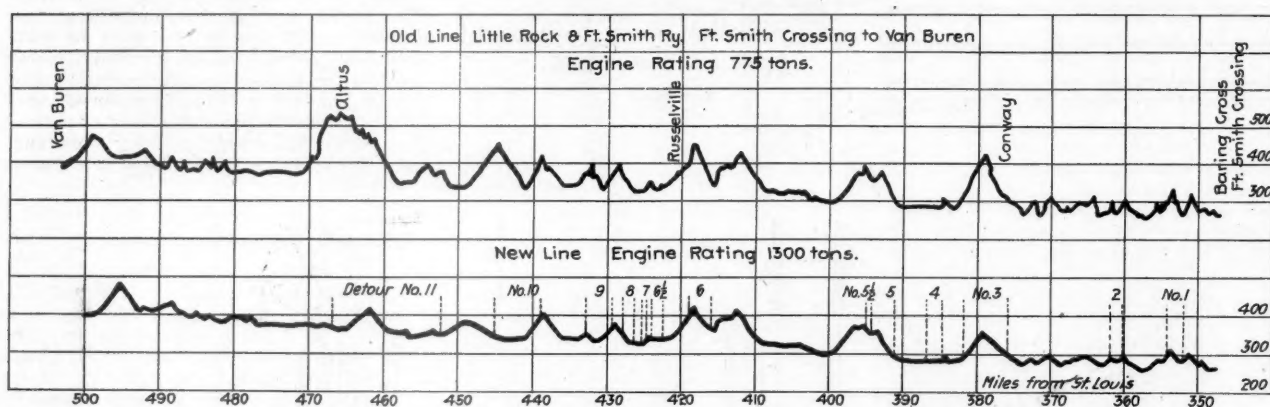
(Continued from page 189.)

The preceding article outlined the early history of the Missouri Pacific System from the time of its acquisition by Jay Gould up to the present period of expansion, which began six years ago. This article will briefly describe the reconstruction work which has been done and the new lines which have been built, all of which is a part of a well defined plan of improvements made before any of the work was started. In a subsequent issue, the purposes of the work which has already been done and the ultimate aim of the management will be pointed out.

The first extensive piece of work which was undertaken was the change of grade and alignment on the main line of the Iron Mountain through Arkansas. This part of the system had always carried a heavy traffic both in freight and passengers and had a large earning capacity, although in many ways it was one of the worst lines to operate economically because of its adverse physical conditions. From St. Louis south to De Soto, Mo., the road follows the Mississippi for much of the way and has no grades of any consequence, but between De Soto and Piedmont it crosses the range of hills known as the Iron Mountain, from which it

charge and was thus enabled to handle it with the least possible interruption and delay of traffic. No serious accidents or congestion which might have been directly attributed to this reconstruction occurred while it was going on and the benefits derived from the increase in train load which was made possible were felt almost from the beginning. Where trains had formerly been limited to 1,390 tons between Newport and Little Rock, they were increased to 1,600 tons, and south of Little Rock to Texarkana, the increase was from 890 tons to 1,600 tons. The heavy grade over the summit between De Soto and Piedmont was also materially reduced and the entire line was rebalasted with rock and gravel, many of the lifts through the swamp lands being made with gravel alone to a depth of 4 ft. and even more. New 75-lb. rail was laid, permanent culverts put in to replace timber trestles and all of the bridges put in good condition for carrying heavy engines. Yards were increased and sidings lengthened at the same time so that when the improvements were entirely completed, the line from St. Louis to Texarkana, some 490 miles, was in fine shape to handle any amount of business within the restricted limits of a single-track road. The total cost of the work north of Little Rock was approximately \$230,000, and about

The general plans for grade improvements and reconstruction also included some heavy work at both ends of the line from Kansas City to Little Rock. This part of the system had been growing in importance rapidly with the development of southeastern Kansas and Indian Territory, and it was essential in order to hold the territory which it traversed from the inroads of active competitors, to place the entire line in satisfactory shape for economical operation. Surveys were made for a .75 per cent. grade line from Osawatomie, Kan., south to Coffeyville, which included three important detours from the old right-of-way, the most important being one about 8.5 miles along around Yates Center which eliminated much curvature and was made without heavy cutting. The detour around Mt. Ida, 3.5 miles long, reduced the grade from 1.5 per cent. and was made to avoid the heavy expense of cutting down the main line at that point which it was estimated would cost about \$130,000 more than the detour. South of Coffeyville, the Kansas & Arkansas Valley, which is operated by the Iron Mountain, has no grades heavier than .75 per cent., and it needed little extra work aside from laying heavy rail, ballasting and lengthening sidings, to put it on a par with the north end of the line.



Condensed Profiles of Little Rock & Fort Smith Line Before and After Grade Adjustments.

takes its name, and over the summit of these hills there was a 2 per cent. grade. From Piedmont south through Arkansas to Texarkana, grades of 1 per cent. were quite frequent and in a number of places bad curves had been located in the original survey. Plans were made to cut down all grades between Newport, Ark., and Texarkana to a maximum of .6 per cent., and to improve the alignment also, at the same time taking out the numerous sags and filling in the low spots through the swamps. The work was begun early in 1898 and was stretched out over about 75 miles of track north of Little Rock and at a number of the worst hills south of Little Rock. Steam shovels were put to work in the heaviest cuts and although delayed by unfavorable weather and other causes, the preparation of the subgrade and shifting of the tracks to the new alignment was practically completed by the end of 1900 on the line north of Little Rock. South of that point, the improvements were not completed until the end of 1902, for the work on that section while not spread out over so much ground was much heavier and more difficult to complete.

During the time that these improvements were being made, the traffic on the Iron Mountain increased tremendously in volume and made any rapid completion of the grade adjustment impossible. The operating department had all of the work under its

\$840,000 for the improvements south of that point.

While these changes were being made on the main line of the Iron Mountain, a reduction of grades was also being made on the Valley Division between Little Rock and Arkansas City, 114 miles. The grades between Pine Bluff and Little Rock were reduced from a maximum of 79 ft. per mile to 26 ft. per mile. Grades of 42 ft. per mile were used indiscriminately on the old line and this kept the train load down to about 900 tons for the 10-wheel engines which were used over this division. After the grade reduction the train load for the same class of engines was increased 400 tons. At the same time the bridges on the south end of this division between McGehee and Riverton, La., were changed to carry heavy engines, and most of the north end was ballasted up to standard. All of the sidings and passing tracks were lengthened out to accommodate longer trains and the whole line from Little Rock to the connection with the Texas & Pacific line to New Orleans was put in shape to handle heavy traffic. No heavy work was necessary on the south end since the road runs for most of the way through the low swamp lands and is almost level. After nearly two years' work the grade reduction between Pine Bluff and Little Rock was completed in 1902 at a total cost of about \$170,000.

By far the most extensive and complete reconstruction was done on the south end between Fort Smith and Little Rock. Although this line follows the Arkansas river for its entire length and might well have been built with a merely nominal ruling grade, it had been put through, apparently, with the least expense. The maximum grade was 92.5 ft. per mile, and grades of 80 ft. per mile were used indiscriminately. Of its entire length of 163 miles only 32 miles were level, and it was manifestly impossible to operate heavy trains over such a route until it had been rebuilt completely. It was decided to establish a ruling grade of .6 per cent. and to eliminate as much as possible of the rise and fall in the old line. Thirteen detours, aggregating about 43 miles, were surveyed and work was begun early in 1902. The line is now being ballasted and put in condition for carrying heavy traffic, new 75-lb. rails having been laid, bridges strengthened and additional sidings and yard facilities at both ends having been provided. This work was the most expensive which has been done, the Little Rock & Fort Smith improvements alone having cost nearly \$3,500,000 to date. The work done north of Coffeyville on the Missouri Pacific lines cost about \$750,000, bringing the total cost with miscellaneous expenditures on the Kansas & Arkansas Valley up to \$4,500,000, or nearly \$10,000 a mile. As on the main line recon-

struction on the Iron Mountain, all of this work was done under the direction of the operating department and with the least possible interruption of traffic.

The accompanying condensed profiles give some idea of the amount of grade reductions made. The changes have resulted in an increase in the tonnage rating of engines from 800 tons to 1,300 tons between Osawatimie and Leroy, 51 miles, from 1,000 tons to 1,450 tons between Leroy and Coffeyville, 76 miles, and from 775 tons to 1,300 tons between Fort Smith and Little Rock, 165 miles. The effects of these more recent improvements have not yet begun to show in reductions in operating expenses, but within the next year as the new grading settles and engines can be safely loaded to their full capacity a large decrease in expenses per ton mile will be shown, without doubt.

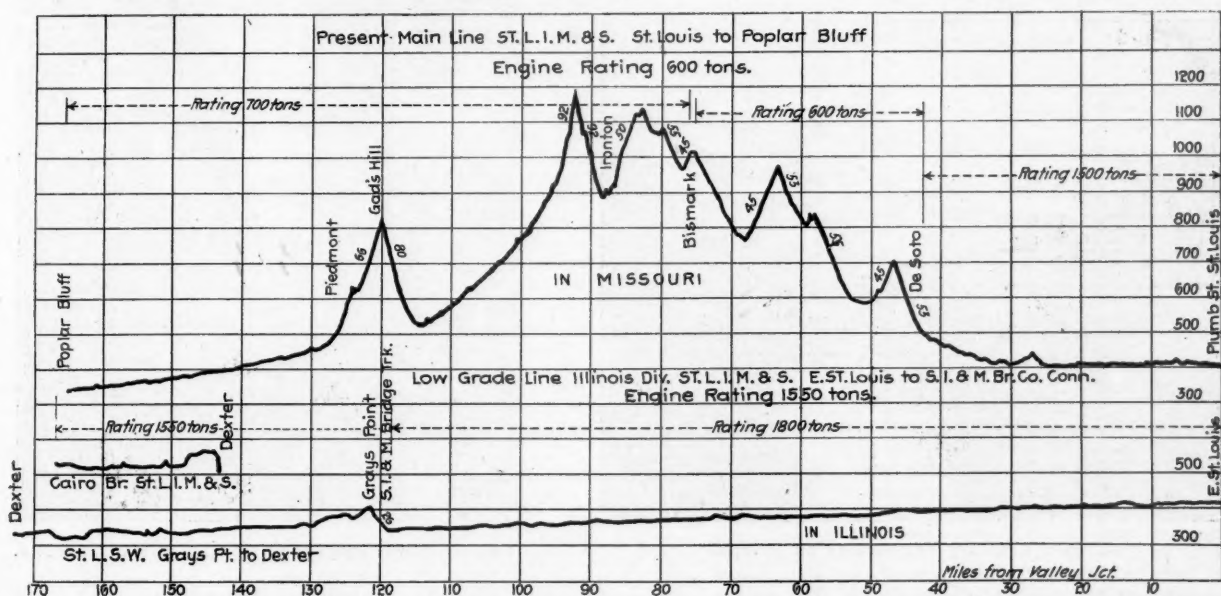
Most of the new construction which has been done within the last three years is confined to the territory lying between the main line of the Iron Mountain and the Mississippi river. It has for its ultimate object the completion of a new low-grade route from St. Louis to New Orleans, and the development of eastern Arkansas and Louisiana. An

Gray's Point at the west end of the bridge to Dexter on the Cairo Branch of the Iron Mountain, thus completing the connection at the south end. In Louisiana and Arkansas, the New Orleans & Northwestern from Vidalia, opposite Natchez, Miss., north to Bastrop, La., and the Mississippi River, Hamburg & Western, were also purchased and the plans for new construction were altered somewhat to fit the changed conditions. A new line, following the river was surveyed south from Helena and West Memphis through McGehee, Ark., to Clayton on the N. O. & N. W. to connect with a new line of the Texas & Pacific running north from Port Allen, La., and an extension of the Hamburg & Western to connect with the Camden Branch at Eldorado was also provided for. With the exception of a short stretch of about 30 miles between Poplar Bluff and Knobel on the main line this gives a parallel route all the way to New Orleans with no grades greater than .6 per cent., connected with the main line by branches at frequent intervals and traversing an exceptionally rich agricultural and timber country which through lack of railroad facilities has not heretofore been developed.

times of high water and inundates the surrounding country with from eight to ten feet of water, and owing to the scarcity of suitable material for making the high fill required, a pile and timber trestle was built. The levels and surveys were made from platforms built in the tree-tops, the surveying party going from station to station in boats.

The new White River line from Diaz on the Iron Mountain northwest to Carthage, Mo., 271 miles, is still under construction. It traverses a sparsely settled mountainous country exceedingly rich in minerals and hard wood timber, and involves some very heavy work, including five tunnels, the longest of which is about half a mile. The ruling grade is .75 per cent. and the entire line will be finished up to the main line standards with stone and chats ballast, 75-lb. rail, heavy bridges, etc. This is the longest single piece of new construction which has been undertaken and will probably be the most important of the new lines in the future development of the system.

Little new construction has been planned or carried out in the territory occupied by the lines operated by the Missouri Pacific proper. The only work of any importance



Condensed Profiles of Iron Mountain Main Line and New River Division between St. Louis and Poplar Bluff.

integral part of this scheme is the new White River line from Carthage, Mo., on the Missouri Pacific across northern Arkansas and the Ozark Mountains to Diaz on the Iron Mountain, thus giving another connection between the lines in Kansas and the Gulf.

As originally planned a new river-grade line was to be built south from St. Louis along the west bank of the Mississippi to connect at Jackson with a short branch line from Allenville on the Belmont Branch. South from Allenville the new line was to be run to Paragould, Ark., to connect with the Helena Branch, which was to be extended south to McGehee, from which point a line was already in operation through Louisiana to Alexandria on the Texas & Pacific. This scheme was considerably modified, however, by the project for a bridge across the Mississippi at Thebes, Ill., and the construction by independent interests of a low-grade line from East St. Louis to Thebes, following the east bank of the river. The Iron Mountain bought this line with its branches in the Big Muddy coal fields and trackage rights over the new bridge and secured trackage rights over the St. Louis Southwestern from

The new line through Illinois has a ruling grade of .25 per cent. except on the approaches to the Thebes bridge. It is laid with 85-lb. rail, is ballasted throughout with stone and chats and has extensive terminals in East St. Louis. Passenger trains from St. Louis are run over the Eads Bridge, but most of the freight consigned to or from St. Louis and points west is carried over the river on a car ferry running between Ivory, Mo., and Bixby, Ill., just south of St. Louis.

There were no particular difficulties encountered in the construction of the lines in Louisiana and Arkansas aside from the scarcity of suitable ballasting materials. Except where the land has been cleared on some of the plantations near the river, the country is virgin timber land and gumbo swamps which are under water for much of the year. Only one engineering problem of any importance was met with in the construction of these lines in the south, and that was at the crossing of the Eldorado & Bastrop over the Ouachita river. This required a 250-ft. draw span and 12,000 ft. of wooden trestle approaches across the bayou. Like most of the streams in this region, the Ouachita overflows its banks in

has been the completion of a low-grade route from Jefferson City to Kansas City following the Missouri river for the entire distance, and the building of the Carthage & Western, 18 miles long, from Carthage to a connection with the Kansas City Southern at Asbury, thus giving an outlet to the White River line into the region covered by the network of lines in southeastern Kansas.

The new low-grade line along the Missouri river involved the construction of 42 miles between Jefferson City and Boonville on the east end, heavy grade reductions on the old line of the Lexington Branch between Boonville and Lake City, including six short detour lines and the construction of about eight miles of new line at the west end from Lake City to the tracks of Atchison, Topeka & Santa Fe, over which trackage rights were secured for 8.5 miles to a connection with the Missouri Pacific main line just east of Kansas City. This gives a .3 per cent. grade line between Jefferson City and Kansas City as against a 1.4 per cent. grade line via the old route through Pleasant Hill and Independence, and increases the tonnage rating of engines from 900 tons to 1,300 tons.

The new line at the east end was built

during 1901 while the grade adjustment work was going on west of Boonville. For much of the distance the bluffs rise perpendicularly from the water's edge and this required some heavy cutting in rock and the construction of dykes to deflect the current and protect the banks from washing. Where the bluffs recede from the river the roadbed was made from the surplus rock excavated and the exposed slopes were protected with riprap. The entire line from Jefferson City to the connection with the Santa Fe has been laid with 75-lb. rail and ballasted with rock. It is now used almost exclusively for through freight to and from the West, all of the through passenger trains being run over the old line via Pleasant Hill.

(To be Continued.)

An Efficient Telpherway.

The United Telpherage Company, New York, has installed at Milton, Mass., an overhead suspension electrical telpherage line for the Walter Baker Chocolate Company. This line is about one-sixth of a mile long and runs from the railroad freight house

Lecture on the "19" and "31" Forms of Train Orders.*

So far as the order itself is concerned, there is no difference between the "19" form and the "31" form; but the "31" form requires that the signature of the persons addressed be transmitted to the despatcher, and the "19" form does not. The Train-Rule Committee of the American Railway Association will, doubtless, agree that there is no movement made by the use of the "31" form that cannot also be made with the "19." Any train order must be respected, without regard to whether it be on green or yellow paper, or whether it has or has not been receipted for. If through error, necessity, or bad judgment a train be deprived of its superiority by use of the "19" form, the order must be accepted and obeyed. And, while a train may thus lose right or have right conferred upon it by either form (and such orders must be respected without regard to whether given by "19" form or "31" form), ordinarily, the "31" form must be used when a train is to be made inferior, and

to some station beyond, as such train cannot leave without the order, unless the train which it was previously directed to meet at such station has arrived. A "19" order may be used to authorize a train to run extra, or for one train to pass another, as, in the absence of notice, the train so passing must protect itself, if it stops or is delayed. This is a no more serious restriction than that provided for in Rule 93. It is an open question whether it is best to require any freight train to have an order to proceed ahead of a superior freight. The claim is made, and with good reason, that the order to run ahead makes the crew receiving it lax in their observance of Rule 99. The "19" form may be used for "slow" orders, where but one order awaits the arrival of a train at any station; or to notify trains of cattle on the right-of-way, or of a water-supply failure; or for train movements where no accident could happen through non-delivery of



Trucks Crossing Telpherway on Bridge.



Telpher Train Suspended 50 ft. above the Ground.

to the top floor of the company's mill. Before this line was installed, the company had to truck all materials by teams by way of a long and circuitous route. The portion of the track which passes over level ground is supported by bents 35 ft. high resting on concrete foundations. The supports for the portion of the track along the cliff are of 14-in. square Georgia pine ranging in length from 30 ft. to 40 ft. The foundations of these posts are cut out of the solid rock. The telpherway crosses the river adjoining the mill over a steel bridge having a span of 80 ft. The electric locomotive runs on the top of a single overhead rail and is controlled by an operator in an enclosed cab that is suspended from the telpherway directly beneath the track. The apparatus is fitted with a brake which is capable of stopping the train within its own length. The current is supplied through a trolley wire. The train is 30 ft. long and runs at an average speed of 700 f.p.m. The weight of the machine is 4,600 lbs. and with the three loaded trucks the total moving load on the structure is 12,000 lbs. It is claimed that the cost of power for running this machine for a day of 10 hrs. is but \$1.00. The general appearance of the locality in which this line is situated is shown in the accompanying illustrations.

the "19" form only used when, if not delivered, nothing worse than a delay would result. The possibility of delay, through failure in the delivery of such orders, should not, however, be seriously regarded, as there are so many advantages in the use of "19" orders to offset the very rare chance of failure—which, the records show, has only been about one in a hundred thousand orders. There has been a corresponding number of failures in the delivery of "31" orders.

A meeting point must not be made at a telegraph office, or a blind siding, by using "19" orders for all trains. The superior train must be given a "31" order and the inferior train may be given either a "19" or a "31." There is an exception to be made, however, when a train order is to be first given to the operator at the meeting station; then a "19" may be used for either train. Extra trains must not be met by using "19" orders, unless the order is first addressed to the operator where they are to meet and is issued for all extra trains concerned before they reach the place of meeting, as there are no "superior" extra trains. A "19" order may be addressed to a train at the train-order meeting point, changing the place of meeting

the orders. They must not fail to be delivered, however, nor must the impression prevail that it is unnecessary to display the train-order signal at "stop" for such orders, or that their delivery is not as important as the delivery of "31" orders; failure in either case deserves equally severe censure.

In the event of a broken rail, a burned bridge, a washout, or other defect of track, where trains must reduce speed to less than 30 miles an hour, the "31" form is the proper one to use for the purpose of notifying them. The "19" form was framed with the view to helping trains without stopping them, as they are generally delivered to trains while they are in motion, unless they happen to be standing at a station waiting for orders. As the "19" order does not of itself clear a train, so long as the order signal indicates "stop" and the operator must not change the signal to "proceed" until the order is delivered to both the engineman and conductor, a clearance card must be delivered with such orders, stating over the operator's signature that there are no further orders for the train, except when he can deliver the order to both the engineman and conductor and change the signal to "proceed" within their view. A "19" order should not be issued to a superior train, directing it to take the siding and meet an inferior train, even

*From a forthcoming book on "Rights of Trains on Single Track," by H. W. Forman, to be published by the Railroad Gazette.

though the same order be issued to the operator at the meeting station, as in case of failure in the delivery of the order to the superior train before it reaches the meeting point, it would then hold the main track as far as the order signal, with the possibility of collision with the inferior train.

As far as possible, dispatchers should avoid issuing both "19" and "31" orders for the same train at the same station, since a train can be cleared by clearance card on delivery of either order, with the signal at "stop," or the same result would follow if either be delivered, and the order signal then be changed to "proceed." The train must be stopped anyway, to get the acknowledgment of a "31" order; so no time would be saved by issuing other orders on the "19" form, with the chance of the operator's delivering only the "19" order and then clearing the train. Operators should be instructed to guard against the danger of delivering "19" orders to engineers, with or without a clearance card, when they also have a "31" order for the same train. An engineman having received a "19" order might see the train-order signal changed to "proceed," although, without his knowledge, a "31" order had been delivered to the conductor, and, should an unauthorized starting signal be given, he might proceed before the conductor could reach him with the "31" order; while this would not be likely to happen if no orders were prematurely delivered to him. In cases where orders on both forms are awaiting the arrival of a train, operators must not deliver anything to the engineman until the conductor has acknowledged the "31" orders.

When a meeting or waiting point is fixed, by addressing the order to the operator at the meeting or waiting station, say, at C, as well as to both trains, one on each side of it, say, at B and D, respectively, the operator at the meeting point (C) must deliver copies of the order to the enginemen and conductors of all trains affected until he is positive that all trains moving in the same direction have arrived (and, in case the inferior train arrives first, until it is clear of the main track). He must then change his order signal to "proceed," unless the order is also addressed to a train, or there are other orders in effect at that station. If it is a meeting order, the operator will display both order signals; if a time order, he will display only that signal which will stop the train which is to be held. When the time given in a waiting order has expired the operator will change the order signal to "proceed," without regard to whether the train to be waited for has arrived or not; provided, always, that the order is addressed only to the operator. If his clock is not reliable, he should obtain correct time from the dispatcher before restoring the order signal to "proceed."

It is proper and often necessary to issue a "31" order for one or both trains and to address the same order to the operator at the meeting point on the "19" form. It is also proper to address a "31" order to an operator and to trains at his station; the same order may also be issued on the "19" form for trains which have not yet reached his station.

Should a train reach a station and find the order signal at "stop," and an order addressed only to the operator should be delivered to it, a copy of which it had not previously received, stating that the train will meet or wait for some other train at that station, or wait for a work extra until a certain time has elapsed, such order must be accepted and understood as holding the train thus notified, as there may have been a failure in the delivery of orders to the superior train before reaching such station. It must be

understood, however, that an order, when only addressed to the operator, simply holds the train. Orders conferring right must be addressed to the trains that are to execute them, as prescribed by Rule 204.

A "19" order is sometimes as safe as a "31" order when but one order is issued; but when more than one is to be given a train at the same station, the "31" form is the safer, for the reason that an acknowledgment of all the orders is obtained from all concerned. The single "19" is theoretically as safe as the single "31," as the train addressed cannot pass the order signal without an order while it indicates "stop," and the "19" form of order can reach it just as well as any other.

On the question of extending the use of the "19" form of train order and addressing it to operators at meeting points, and to trains interested in the movement, the author wishes to record his unqualified endorsement of the practice, having successfully used it for twenty-five years on a single-track road where seventy or eighty trains were moved daily with entire safety and with considerable advantage in the matter of time saved. The fact that several of the largest roads in the Middle West have adopted rules requiring meeting orders to be addressed to the operator at the meeting point, in addition to the superior train before it reaches such station, would seem to indicate that there is something lacking in the Code rules in this respect, or that meeting points are likely to be overlooked by train and enginemen if this precaution is not taken. It must be evident to every one that two order signals against trains are safer than one. If a "31" order be issued and the crew forget the meeting point, a collision is possible; but give the same train a "19" order addressed also to the operator at the meeting point, and the safeguards against accident are greatly increased, for even should the superior train forget the order, the operator's signal at the meeting point is displayed at "stop," and remains so displayed until all the trains going in one direction have arrived.

In meeting freight trains, much time can be saved by using "19" orders. It requires from ten to twenty minutes to get signatures to "31" orders, and on grades there is also further delay in getting under headway. This can be avoided by using "19" orders to fix meeting points, addressing them to all trains and in duplicate to operators at places of meeting. Something can also be saved in expense of operation, as it costs from 25 to 40 cents to stop a freight train to get acknowledgment of orders. In connection with this plan of using "19" orders, the semaphore form of train-order signal should be used, and dispatchers must not be tied down too closely by instructions. Should it be necessary in certain rare cases to instruct operators to allow a train to pass an order signal by changing it to "proceed" for a brief interval of time, the dispatcher should be allowed to so instruct them. The Code rules now permit operators to do this, without instructions from any one, when the normal position of such signals is at "stop."

The part of the railroad up the Jungfrau known as the Eiger Tunnel reached a point 9,840 ft. above sea level about July 1. The fears that men would not be able to work at that elevation proved groundless; the men soon became acclimatized and there was very little mountain sickness. It is expected that this tunnel will be completed to the point on the south side of the mountain, where it comes to the surface, 10,824 ft. above the sea, about the end of this year. Work is to be prosecuted in the winter.

Progress in Railroad Bridge Building.*

BY F. C. M'MATH,†

Nowhere in the world has the art of bridge building progressed faster than in the United States. Previous to 1860 practically all of the truss bridges were of timber construction—mainly of the Howe truss type. About this date the building of spans with cast-iron compression members and wrought-iron tension members became the fashion, and a few metal bridge-building establishments sprang up; each concern usually adhering to some particular type of construction, such as the Fink truss or Bollman truss. The old Detroit Bridge and Iron Works was one of these pioneer companies and built bridges under the Bollman patents. Metal bridges were somewhat expensive in those days, the old records of the Detroit Bridge and Iron Works showing prices from 8 to 10 cents per lb. Not many railroads could afford metal structures at such figures, and combination wood and iron bridges began to be largely used, especially by the railroads in the West.

About 1880 bridges constructed entirely of wrought iron began to be commonly used. Seven or eight years later, steel eyebars were substituted for wrought-iron tension members, and about 1890 the iron compression members had to give way to those of steel. The change from iron to steel was opposed by many engineers, but steel won the day on account of its lower cost.

During the period of change in the materials of bridge building, a very great change took place in the weight of rolling stock. In 1860 an ordinary locomotive and tender would weigh about 40 tons; in 1880 a 66-ton engine was thought a monster. In 1890 engines of 100 tons were believed to be about the limit, but now there are plenty of engines weighing, with tender, 140 to 150 tons. These radical increases in loads naturally have had a marked effect on the bridge-building industry. A bridge built for the loads of 1860 needed renewal about 1880 and structures designed for 1880 conditions had to come out before 1900. This is an understatement rather than an exaggeration. I know of one structure in Michigan that has been renewed no less than three times by one company. It is doubtful whether the limit in loads has yet been reached.

Pin-connected spans have been the favorite type in the United States from the earliest days of metal bridge building. Some years ago quite a controversy arose between American and English engineers as to the relative merits of pin and riveted spans, the latter being the distinctly English type. American engineers apparently had the best of the argument, the pin structures being unquestionably lighter in weight and cheaper to erect. In recent years, however, a strong tendency has set in toward the use of riveted structures for spans of short or moderate length. Most bridge engineers would not now use pin designs for spans less than 125 ft.; and a few railroads, such as the New York Central Railroad, have practically abandoned pin bridges altogether and are now making the riveted bridge their standard type. In Canada the riveted bridge has been in favor for some time by the leading railroad companies, being used quite generally for all spans up to 200 ft., whether single or double track. The English engineers were nearly right in their old contention in favor of riveted bridges—at least for spans less than 200 ft., which cover the bulk of ordinary railroad structures. American engi-

*Extracts from an address delivered at the 10th annual banquet of the Detroit Engineering Society. Reprinted from the Journal of the Association of Engineering Societies.

†President of the Detroit Engineering Society.

neers, however, have by no means copied English designs, even if they are coming around to the English type.

American designs use longer panels and much deeper trusses, and on this account our structures are lighter, stiffer, better and cheaper than the English. For some unknown reason the English engineer feels that the slope of his diagonal truss members must be exactly 45 deg., if possible, and that the depth of truss must not exceed one-eighth the span length. His adherence to these thumb rules makes his designs heavy and expensive, and, for short spans, often defective in their top chord bracing. He uses difficult details, apparently taken from ship-building practice, where probably there are good reasons for their use, for it must be admitted that the English are masters of the art of shipbuilding.

During the past few years a marked improvement has been made in bridge floors. Timber floors are still in general use, but cross ties and guards are now much more substantial than formerly, and the space between the ties has been reduced from 8 in. or more, down to 4 in. Some of the trunk lines are abandoning timber floors altogether, and are using solid metal floors carrying gravel or rock ballast. These floors are exceedingly satisfactory in actual use, their great weight and rigidity reducing impact and vibration to a minimum. The only objection to such floors lies in their higher first cost and liability to deterioration by rust. The most common type of solid floor is the trough floor, but it is expensive and very difficult to protect against rust. One of the cheapest and best types of solid floor is in general use on the Michigan Central, and is being used to an increasing extent by other roads. It is known as the Douglas solid floor.

In the last two decades great progress has been made by the bridge builders. General methods and processes have shown no radical changes; but better system, more powerful machinery, pneumatic and electric handling devices, have reduced costs. Bridge shops have greatly increased in number and in capacity. Fifteen years ago no single concern had a capacity exceeding 2,000 tons of bridge work per month. This output at the present time is far exceeded by many shops, and there is now a single plant with an estimated monthly capacity of 20,000 tons. This is the new plant recently completed by the American Bridge Company, at Ambridge, near Pittsburgh. Some idea of the magnitude of the concern will be gained when it is known that provision has been made in the office for upward of 500 draughtsmen. Single pieces weighing 80 tons can be made and handled in this shop. Eyebars 16 in. wide can be made in the forge department.

Structures can be built to-day that would have been impossible a few years ago. This is the day of big things in bridge building, as well as in other lines of work. More huge bridges are under way than ever before. A 671-ft. cantilever span is being built over the Mississippi River at Thebes, Ill. The Wabash has completed two cantilevers—one of 700 ft. span over the Ohio, and one of 812 ft. over the Monongahela River. At Quebec a cantilever span is being built over the St. Lawrence River, with a record-breaking span of 1,800 feet. At New York a 1,600-ft. wire cable suspension bridge over the East River has been completed, and contracts have been let for a second bridge of cantilever construction, with a span of 1,182 ft. Plans are under way for a third bridge of 1,470 ft. span, suspension type.

In the Blackwell's Island cantilever bridge nickel-steel eyebars are to be used. The specifications for this bridge require full-sized annealed nickel-steel eyebars to have an

ultimate tensile strength of not less than 80,000 lbs. per sq. in., whereas the minimum permitted for ordinary steel eyebars is only 56,000 lbs. It is thus apparent that the nickel-steel is about 50 per cent. stronger than the ordinary steel, a gain of enormous importance in bridge building. If nickel-steel can be supplied at reasonable figures, it will be widely used, especially in long spans. The Orford Copper Company is now arranging for the rolling of a quantity of nickel-steel plates and angles with a view to having bridge shops try them under the ordinary processes of construction. If no unforeseen difficulties are encountered, it should be feasible to use nickel-steel for compression members as well as for eyebars in long spans.

Progress in bridge building has certainly been great in the past, but there is still plenty of opportunity for further development and improvement. Some of the advocates of concrete-steel are prophesying the substitution of concrete-steel in place of steel girders for short railroad bridges, but the metal bridge builders are not yet particularly worried over prospective loss of this business.

There is yet much to be done in the way of standardizing bridge specifications. Various opinions are still held by engineers regarding the quality of steel to be used, loads to be provided for, and permissible unit strains. Prof. Heller, of the Ohio State University, has recently made an interesting comparison of railway bridge specifications. He made a detailed comparison of about 30 railroad specifications, and found a surprising lack of uniformity. Selecting a certain member of the bottom chord of a 134-ft. span, he found, under a given loading, the total stress to be 270,000 pounds. Using the averages of unit stresses of 28 different specifications, he found 25.4 sq. in. of metal required to resist this strain. The area required by the lightest specification was 11.4 per cent. below the average, whereas the heaviest specification required 18.6 per cent. more area, the total variation thus amounting to 30 per cent. He made similar calculations for the stringers of the same span, and found a total variation of 55 per cent. from the average.

Bridge designing is supposed to be one of the exact sciences, but it is very evident that there is no reason for bridge engineers to brag of exactness when their opinions of unit stresses vary to the extent shown above. It is to be hoped that, at some not very distant day, they will get together and adopt a standard specification. Strong efforts are now being made in this direction, and it is the devout wish of the bridge builder that they may be successful.

Hansel's Pipe Carriers and Foundations.

Mr. Charles Hansel has designed a pipe carrier for supporting the rods connecting signals and switches with interlocking machines, which fastens to the foundation without the use of screws or bolts; and, in connection therewith, an iron top for the concrete foundations usually used for supporting switch and signal connections. This top is made round to facilitate fitting, and a similar top has been designed for supporting bell cranks and compensators. These fixtures are illustrated in the accompanying engravings, and Mr. Hansel has applied for patents on them.

Fig. 1 shows all of the parts which it would be necessary to carry in stock for pipe carriers and foundations complete, except the concrete pillar; and Fig. 2 shows these parts assembled in an eleven-way pipe carrier foundation, carrying, also, four wire pulleys.

Fig. 3 shows the foundations for a lazy

jack compensator. Four or six piers may be used in the foundation if necessary. The piers are 2 ft. 6 in. long, six inches longer than the usual oak foundation. For a bell crank or any smaller part the piers can be set nearer together than in Fig. 3.

The pipe carrier, Fig. 2, is similar to the "E. Z." carrier made by the Pneumatic Signal Company, except that the foot of the standard 4 (Fig. 1) instead of being flat

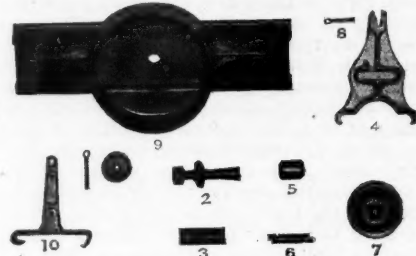


Fig. 1—Iron Cap and Details of Carrier.

and provided with holes for lag screws, has the foot curved inward, to fit cap 9, the principle being the same as that employed by Mr. Hansel in the design which he got out in 1898 (*Railroad Gazette*, Jan. 7, p. 9). The unit of the foundation is a six-way, but it may be any number of ways desired.

The setting up of one of these carriers is simple. After planting the concrete pier, the short piece of split pipe 3 is slipped over the bolt 2, and dropped into the hole in the

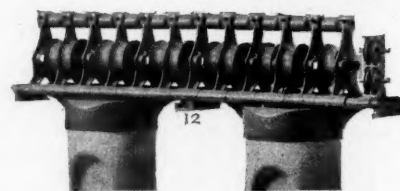


Fig. 2—Hansel's Pipe-Carrier.

center of the top of the pier, the parts 2 and 3 forming a simple expansion bolt. The cap 9 is then placed on the pier and after it is adjusted to the proper angle with the rail the expansion bolt is tightened and the cap drawn firmly down on the pier.

The assembling of the pipe carriers on this foundation can be done rapidly, and the piece 6 fastens the whole and forms an axle for the top roller 5. In Fig. 2 the two units



Fig. 3—Foundation Caps for Compensator

are held together by wedge clamp 12, which is driven on from the side.

It will be seen that the number of parts necessary to be carried in stock to provide the fixtures named is small. Mr. Hansel has tested his devices and believes that he can promise a saving of 10 per cent. or more in the cost of foundations. The pillar can be firmly fixed in the ground without carefully adjusting its position to that of the rail. The cap, being circular, can be easily turned to the proper position in relation to the track. He proposes to provide hinged cast-iron moulds in which to make the concrete pillars. Such moulds could be easily transported from place to place, thus enabling the signal department to make its pillars at the points where they are to be used.

GENERAL NEWS SECTION

THE SCRAP HEAP.

On the middle division of the Pennsylvania a number of freight engines have been assigned to regular crews.

A press despatch from Chicago says that the Rock Island has temporarily laid off about one-fourth of the men in its shops.

On a new freight line which the Pennsylvania is soon to put in use between Mantua Junction and Gray's Ferry, West Philadelphia, manual block signals will be used, and the communication from cabin to cabin will be by telephone.

Application has been made by the railroads to the court in Louisville, Ky., for an injunction against the ticket brokers of that city forbidding them to deal in the excursion tickets which are to be issued for the convention of the Knights of Pythias in that city.

The Canadian Government, in appropriating large amounts for railroad subsidies for new lines during the past year, has imposed a new condition, viz., that the companies receiving subsidies must use steel rails made in Canada, provided the same can be secured at reasonable prices and of a suitable quality.

The Vandavia Line will run special trains for its employees to the St. Louis World's Fair on Friday nights, August 12, 19 and 26 and September 2, arriving at 8 a.m., and returning at 10 p.m., Saturday. These trains are composed of coaches and will be limited strictly to employees. Regular requests for transportation, through the proper channel, will continue to receive consideration in the case of employees who cannot go on the special trains.

According to a press despatch, Mr. Joseph Bornschin, who died recently in Paducah, Ky., left \$10,000 each to seven locomotive engineers of the Illinois Central who had fired for him when he was a runner on that road. Bornschin was an engineman because of his love for the work, his father being wealthy. On the death of his father a few years ago he resigned his place on the railroad to devote his time to the management of his property.

On August 26, the Railroad Commissioners of Georgia will meet to discuss the question of ordering a reduction of passenger fares from three cents a mile to two cents on the principal railroads of the State. The Chairman has recommended to his fellow commissioners that such an order be made, on the ground that the railroads do not show sufficient enterprise in providing suitable accommodations at stations. If they would build attractive, convenient and comfortable stations, he would favor the continuation of the present rates.

The Manchester Ship Canal.

In the report presented at the shareholders' meeting held at Manchester, England, on August 4, the weight of toll-paying merchandise which passed through the Manchester canal during the six months ending June 30 was given as 1,749,539 tons of sea-borne traffic, an increase of 54,206 tons; and 154,294 tons of barge traffic, an increase of 13,822 tons. Imports of cotton decreased 110,650 bales owing to the prohibitively high prices, which caused spinners to cease all imports. This depression in the staple trade of the

Manchester district naturally affected other trades and resulted in a canal traffic less good than was otherwise to have been expected.

M. C. B. Interchange Rules.

The Rules of Interchange of the Master Car Builders' Association as revised to go into effect Sept. 1, will be furnished at the usual rates by Jos. W. Taylor, Secretary, Rookery Building, Chicago: 25 copies, \$1.00; 50 copies, \$1.75; 100 copies, \$3.00. Less than 20 copies 5 cents each. Postage will be added when sent by mail.

Grain Exports for July.

The monthly report issued by the Bureau of Statistics at Washington, shows that wheat exports for July amounted to only 114,180 bushels, as against 3,884,972 bushels in July, 1903. Exports of wheat for the seven months ending July 31 also decreased, being only 9,323,820 bushels, as against 42,081,141 bushels during the corresponding period in 1903. The causes for this extraordinary decrease in grain exports were fully set forth in our editorial columns of last week on page 225.

Mail Automobiles in Denmark.

As a result of the investigations of the automobile commission recently sent abroad by the Danish government on a tour of inspection to determine the adaptability of the automobile for short-route mail service, the company which has the contract with the government for local mail service has decided to use automobiles in place of stages. Four automobile omnibuses will be given a three months' trial, beginning in September. The following conditions must be met before the automobiles will be purchased. The body of the car must be approved by the commission. It must accommodate 16 passengers and be capable of carrying one ton of freight besides, at an average speed of 12 miles an hour on a 9 per cent. grade. It must run 1,243 miles satisfactorily after coming from the factory, with one of the commission acting as inspector on the trip. The commission is desirous of interesting American manufacturers of omnibus automobiles.—Consular Report.

A Russian Railroad Guide.

Outside barbarians who may have had occasion to learn about trains and stations and distances and speeds on the Russian railroads have heretofore found it a formidable obstacle that the Russian Railroad Guide, naturally, was in the Russian language. Now a foreign language is in most cases about as good as your own for a railroad guide, which, generally speaking, consists of the names of stations, and of figures, and nearly all the names and all the figures are the same in all languages. But between the 36 Russian letters and most readers a great gulf is fixed; and the average American would never guess that *Putia* spelt Riga.

Now, however, there is a way out. An enterprising publisher in Riga, in what are known as the German provinces of Russia, where the Teutonic Knights converted the natives at the point of the sword, and men of German descent have owned most of the land and generally "bossed the job" ever since, has published a Russian railroad guide with the text in German as well as Russian, and German in those Roman let-

ters which Prince Bismarck so despised. It makes a tidy little volume of about 300 pages, with a map of good size, which presumably has all the railroads to date, which is not the case with most accessible maps of Russia. On this map the railroad lines are drawn with a ruler. The station names on it are in both languages.

Men for the New York Subway.

The Interborough Rapid Transit Company is now receiving applications from men who want employment in the new subway railroad shortly to be opened. The applicant must give the names of his employers for the last five years, with length of service with each of them, and reasons for leaving them; must be familiar with the streets and street car lines of New York, its points of interest, and terminals and routes of surface railroads and ferries adjacent thereto. Many other blanks are to be filled in. The class of men applying for work is good. Many come from out of town. The scale of wages is as follows: Experienced motormen, \$3 for ten hours' work; motormen, first year, \$2.75; second year and after, \$3. Conductors, first year, \$2.10; second year, \$2.25; third year and after, \$2.40. Guards, \$1.70; after second year, \$1.80; after third year, \$1.95. Hand switchmen, first year, \$2; after first year, \$2.35. Towermen, first year, \$2.40; after first year, \$2.50. At least 3,000 men will be needed at the start.

Bids for Railroad Supplies in Portugal.

A consular report from Portugal gives the following information and suggestions for firms wishing to supply material for the railroad systems in Portugal. The lines of railroad which are at present open for traffic have a total length of 1,553 miles and are operated by four companies. Extensions on all of the four systems are now in progress. Bids are never asked for publicly for rails, engines and rolling stock, but when these are required, the company interested invites the firms on its list to send bids for what it needs. The report suggests that a firm which wishes to be asked to bid for new railroad equipment or supplies should send its name and address to each of the railroad offices. In furnishing calculations of length and weight, the metric system should be used. The addresses of the four companies operating the railroads in Portugal are as follows:

(1) O Presidente do Conselho d'Administracao da Companhia Real dos Caminhos de Ferro, Rocio, Lisbon, Portugal; (2) Marquis de Gouveia, Director da Companhia dos Caminhos de Ferro da Beira Alta, 1 Rua Victor Cordon, Lisbon, Portugal; (3) O Presidente do Conselho d'Administracao dos Caminhos de Ferro do Estado, Ministerio das Obras Publicas, Lisbon, Portugal; (4) O Presidente do Conselho d'Administracao da Companhia Nacional dos Caminhos de Ferro, 88 Rua S. Nicolau, Lisbon, Portugal.

Arrest of American Engineer in Canada.

The agitation against the employment of American engineers by the Grand Trunk Pacific Railway has resulted in the arrest, at Port Arthur, Ont., of R. Bacon, harbor expert at that place for the company. Mr. Bacon is a Harvard graduate and a member of the American Society of Civil Engineers. He is charged with violating the Alien Labor law, by coming to Canada under a contract with J. R. Stephens, Chief Engineer of the Grand Trunk Pacific, and the warrant under which he was arrested, issued by the Solicitor-General of Canada, orders his deportation to the United States. Mr. Bacon has applied for a stay of proceedings. Since his

coming he has invested a good deal of money in the district. Mr. Bacon claims that the warrant is illegal, as it is a provision of the Alien Labor law that it shall be enforced only against such countries as enforce similar laws against Canadians. As the United States in 1891 passed a law permitting professional men, including civil engineers, to come into the country under contract, it is contended that the Canadian law, being strictly retaliatory in its provisions, does not apply to his case. The courts in Toronto have been applied to for a writ of habeas corpus.

A Universal Saw Bench.

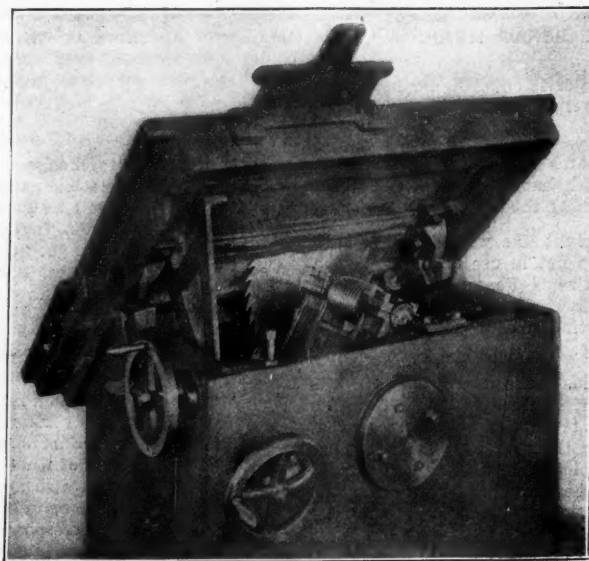
The accompanying illustration shows a universal saw bench built by the F. H. Clement branch of the American Wood Working Machinery Company. The first machine built of this design was placed in the Col-linwood shops of the Lake Shore & Michigan Southern Railroad.

The work guides of the machine are detachable, thus allowing them to be mounted on either side of the saw. By this means it is necessary only to tilt the machine to one side in order to handle inclined work at any angle. The box frame is cast in one piece and has three points of support on the floor, and occupies a floor space of 33 in. x 39 in.

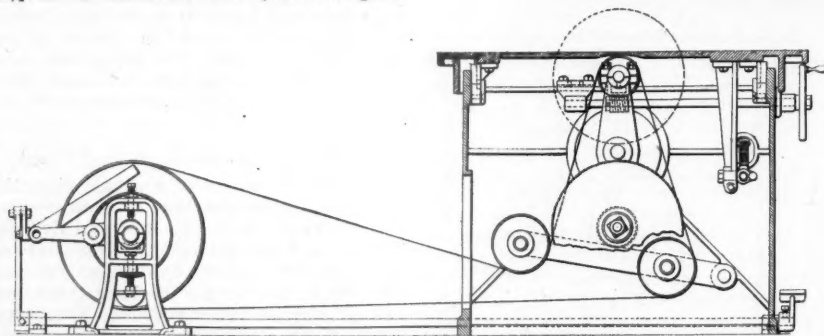
The arbor yoke is supported in self-oiling bearings and carries two steel cast arbors $1\frac{1}{4}$ in. in diameter. The yoke swings in

sions of work can be set without previously determining the angle in degrees. A steel rod which has an adjustable end stop is furnished for cutting off ends. This can be

used for any length between 3 in. and 5 ft. 3 in. A supplementary cut-off gage is fitted to the right-hand or stationary table. It moves in a slot and is supplied with a swivel



Universal Saw Bench, Showing One End of Arbor.

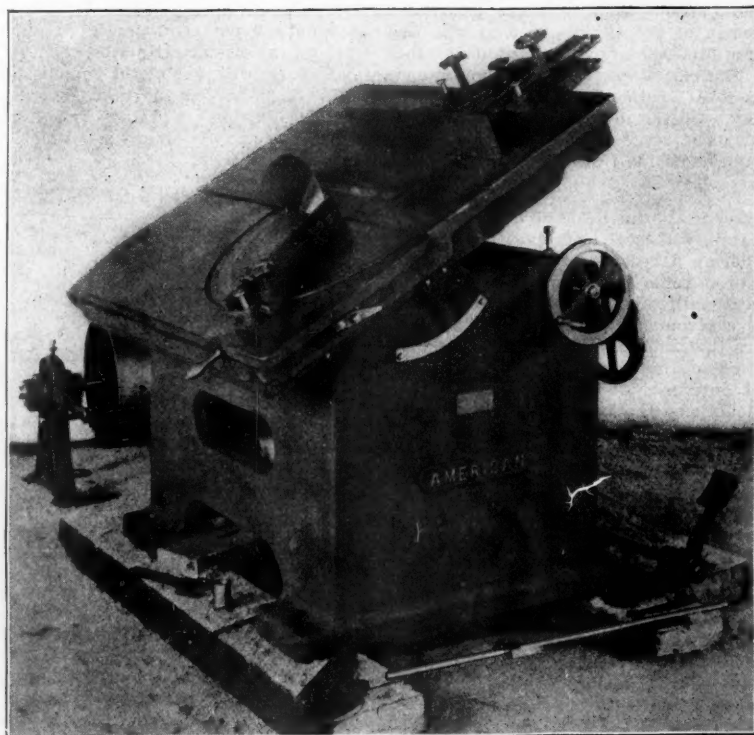


Cross-Section of the Universal Saw Bench, Showing Belt Connections.

gudgeons on both sides of the saw line. The main gudgeon is 7 in. in diameter and has side bearing shoulders $9\frac{1}{2}$ in. in diameter, and is supplied with adjustment to take up wear. The circular adjustment and the rotation of the yoke is made by means of a worm wheel and a double pitch worm. It is also adjustable longitudinally and laterally to take up wear.

The table is 45 in. long by 39 in. wide and is in two sections. The movable left-hand section is 17 in. wide and the right-hand section is 22 in. The left-hand section moves on non-friction rolls guided by a scraped way. This section of the table can be drawn $2\frac{1}{2}$ in. away from the main section of the table, to admit of using dado heads or special cutters. The table has an adjustment of 45 deg. by means of a screw and radius arm. A stop is provided at the rear of the frame which holds the table square with the saw when in a horizontal position. A ripping gage moves the entire width of the main table and will admit boards up to 24 in. wide. This gage swings on one of the retaining pins and can be adjusted to any angle for cutting core boxes, etc. The gage is also fitted with a micrometer adjustment of 8 in. The cut-off or miter gage is swiveled on the movable section of the table and can be set to all principal angles. A protractor is imbedded in the table, which is used for setting all intermediate angles. The protractor is provided with a cross graduated sector, by which angles corresponding to any required dimen-

head graduated to 45 deg., and it is arranged so that it can be connected to the main cut-off gage by a yoke which passes over the saw, thus making a long, well-supported gage for large work. When not in use this gage can be detached. A special sleeve is provided for dado heads up to 2 in. thick. This sleeve takes place of the nut and loose collar on the saw arbor. The tight pulley on the countershaft is 10 in. in diameter by $6\frac{1}{2}$ in. face and should run at 650 r.p.m. The driving pulley is 18 in. in diameter and with the above countershaft speed will give the saw arbors about 2,900 r.p.m. The floor space required for the machine, including countershaft, is 4 ft. x 6 ft. It weighs 2,100 lbs. and requires $\frac{3}{4}$ h.p. for driving.



The American Wood Working Machinery Company's Universal Saw Bench.

Pig Iron Production for July.

The *Iron Age* in its report for the month of July shows that the anthracite and coke pig iron production in this month was only 1,083,000 tons as compared with 1,292,030 tons in June, 1,533,350 tons in May, and 1,555,267 tons in April. The stocks in the hands of merchant furnaces increased about 46,000 tons. At present, the capacity of the furnace plants in operation is about 1,050,000 tons per month, so that production and consumption are very close to each other. On August 1 the number of stacks in blast was 164 as compared with 188 on July 1, and 213 on June 1. The weekly capacity on August 1 was 246,092 tons as against 272,301 tons on July 1, 336,197 tons on June 1, and 368,244 tons on May 1. The largest falling off in production during July was in the Pittsburg, Wheeling, Mahoning Valley, Central and Northern districts, and in Alabama. In the latter section the loss is largely due to labor disturbances. Returns from the plants of the United States Steel Corporation show a production in July of 694,892 tons, as compared with 788,822 tons in June, 927,534 tons in May, 974,006 tons in April, 913,412 tons in March, and 502,994 tons in January. Merchant stocks continue to show the gains made during the second quarter of the year and first noticeable in April. On August 1, the amount of merchant stocks on hand was 667,166 tons as compared with 620,844 tons on July 1, 545,892 tons on June 1, and 444,059 tons on May 1. The greater part of this accumulation during July was in the Central Western and Northwestern districts, with a small increase in the South. With production and consumption on practically the same level, the situation appears more normal. Another encouraging feature is the recent heavy sales of pig iron by a number of blast furnaces, on deliveries extending for a period of between six and eight months.

Buckeye Jacks.

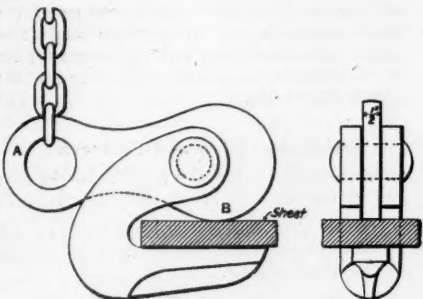
The No. 1 track, or trip jack shown in the accompanying illustration, is made by the Buckeye Jack Manufacturing Company, Louisville, Ohio. It has a lifting capacity of 10 tons. The leverage is compound, double-acting, lifting the load half a notch on both the upward and the downward stroke. The load can be dropped instantly from any height at the will of the operator. It is claimed that the construction of the jack is in strict conformity with the requirements of the Roadmasters' association. The frame or base is malleable iron and the rack is forged steel with machine cut teeth. The pawls are drop forged from high-carbon open-hearth steel and the fulcrum pin is high-carbon rolled steel, machined. The bearings are hardened steel and the handles selected ash or hickory. The weight is 62 lbs. Another jack made by this company is the No. 4 automatic lowering jack. This has a lifting capacity of 15 tons. The lever raises or lowers the load on both the upward and downward strokes, the direction being controlled by an eccentric at the side of the frame. The weight of this jack is 100 lbs. The material of construction is the same as for the No. 1. The intervening numbers, 2 and 3, are automatic lowering jacks of 10 and 12 tons capacity respectively. The former is a useful jack for railroad and general purposes, and the latter



is well adapted for lifting heavy machinery and for similar service. The respective weights are 65 and 85 lbs.

A Clamp for Lifting Boiler Plates.

The accompanying illustration shows a clamp for lifting boiler plate. The clamp is of cast-steel and is adjustable to any thickness of plate. A hook or chain is attached



Clamp for Lifting Boiler Plate.

to point "A," the raising of which brings point "B" to bear against the sheet and thus prevents it from slipping. The greater the stress on point "A" the tighter the grip becomes. This clamp was designed by G. E. Aires, foreman boilermaker of the Cincinnati, Hamilton & Dayton shops at Lima, Ohio. They are made by E. E. Aires & Company, Lima, Ohio.

Useful Hints for Passenger Trainmen.

General Passenger Agent O. W. Ruggles, of the Michigan Central, has issued, for the use of trainmen, a time guide, showing in condensed form the through time and through car service to and from points on connecting lines; and in his introduction he gives the trainmen a number of hints which are worth repeating. He says: "Travelers are much given to asking questions. They ask because they want to know. Elderly people, people traveling alone, ladies with children, who always forget about trains, and business men, who expect other people to remember for them; everyone, in fact, when traveling, is often anxious to know about the time of connecting trains at terminals and other matters of that sort. It helps people greatly if the conductor or porter on the train will readily, courteously, and intelligently give the information desired, with any other useful pointers as to the locality of the station of the road referred to, the best and quickest way to get there, etc. And like the quality of mercy, it blesses both him that gives and him that receives. It helps the conductor or porter in his work, and helps his reputation to be attentive. Stories have been told, and some of them may be true, of the conductor who fell into a fortune by being polite. It helps the company, too, in many ways, to expedite passengers on their journey, and to send them on their way pleased and rejoicing. . . . All conductors and porters are requested to take care to always carry one of these books."

Is This True?

At this season when more women are moving from place to place than all the rest of the year put together, the traveler finds that the average trunk bears the average shock of baggage man, transfer agent and porter less well than in the past. Instead of trunks lasting better than they once did, they last worse. Travel has improved for the passenger. It has grown worse for the baggage. One pays more. It is paid more frequently. It is worse smashed. The secret of this increased ill-treatment of the unoffending

trunk is laid bare in a paper read by H. P. Dearing, general baggage agent of the Michigan Central, before the general association of passenger agents at its last meeting. With incautious frankness he declares that the railroad companies have improved travel at every other point at the expense of baggage. The size of the baggage car has been cut off to provide a smoking-room on fast trains, and where the amount of express matter has grown and the handling of the mail requires more room, provision has been made by trenching directly on the baggage car. Where trunks were once spread out over the floor of the baggage car they are now "tiered." Where a trunk of any size could once be carried, the weight of one piece is now strictly limited to 150 pounds. Where nothing but a trunk flagrantly overweighted was once noted, now each is weighed and excess baggage charged. The passenger has gained something by a system of checks and records which renders it unnecessary on extra baggage to pay two or three times for the same trip, but he has lost, because baggage men in city depots now expect to be feed for their trouble, not in all city depots, but in many, perhaps most. A baggageman 20 or even 10 years ago did not expect a fee for checking a trunk in a hurry or for looking up a piece of baggage. Any passenger now early learns that unless he fees, his trunk mysteriously misses trains, and that a piece of baggage that has been in a large baggage-room for a few hours has a strange way of obscurely hiding and taking an inordinate time for its discovery unless the baggage man on its track has his senses quickened by a fee.—*Philadelphia Press.*

Date Tablet for Concrete Work.

The accompanying cut illustrates a form of mould for securing in the face of concrete work a date tablet of very neat appearance. Patterns of this type have for some time been used in connection with concrete masonry on the New York Central. If the pattern is to be used but a few times, a wooden mould fastened to the forms will serve well. If, however, the mould is required for repeated use, it is found better to have a cast-



Mould for Date Tablet.

ing made which is not easily defaced. The pattern is made of white pine, casting to be chipped and filed to a smooth surface absolutely free from all ridges, and all air holes to be filled with putty. Paint with two coats of black bridge paint. Casting to be fastened to inside of forms on bridge seat, coping or other conspicuous place. When coping is 12 in., as on retaining walls, date should appear just below coping.

Foreign Railroad Notes.

The increased expenses of the Swiss State Railroads are shown by a decrease of 11½ per cent. in their net earnings for the first five months of this year.

It will be remembered that the Hungarian railroad strike was broken by calling out the military reserves to which the greater number of the employees belong. Among the employees many are reserve officers. As the strikers had refused to perform the service which, as State employees, they had sworn to perform, they were guilty of perjury, and a

military court of honor is called to decide what shall be done to the reserve officers who have been guilty of this crime. There would seem to be no other way than to reduce them to the ranks.

The 25th anniversary of the first electric railroad occurred May 31 last. A tiny affair was set up at that date, in 1879, by Siemens & Halske, in a trade exhibition in Berlin. Between that day and September 30 it carried 86,400 passengers, who rode on it out of curiosity, as one might ride on an elephant.

A committee was formed in Hungary to make collections for the railroad men deprived of means of subsistence in consequence of the railroad strike last spring. The management of the State Railroads has sent the subscription paper to all its stations and offices, expressing the hope that the collections may suffice to relieve the misery of many suffering families.

The orders for rolling stock for the Italian railroads from July 1, 1885, to March, 1904, have been filled by Italian and foreign works as follows: By Italy, 917 locomotives, and by other countries, 470; 3,349 passenger cars by Italy and 461 by other countries; 25,442 baggage and freight cars by Italy and 9,392 by other countries. Nearly three-fourths of the expenditures for rolling stock, wheels and springs have been paid to Italian works.

Louis von Perl, Manager of the Russian Railroad Union in St. Petersburg, German by birth, but nearly his life long in the Russian service, died suddenly last June. He long had charge of the relations of the Russian railroads with those of western Europe, and so was probably the best known of Russian railroad men in other European countries. He had much to do with the negotiations which formed the international freight interchange agreement, which has for many purposes made as it were one system of nearly all the railroads of the European continent.

The German Society of Mechanical Engineers offers a prize of 6,000 marks (\$1,418) for a treatise on locomotive construction embracing the theoretical discussion of its fundamental principles. Its announcement says that in spite of the many treatises on the locomotive, there is still lacking an exhaustive theoretical discussion of the thermal, mechanical and geometrical principles involved, such as may serve as a guide in designing engines for special purposes. The same society offers another prize of 1,500 marks for a treatise on passenger car trucks for fast trains.

When the railroad from Milan northwestward through Varese to Lake Lugano, at Porto Ceresio, 46 miles, was changed from a steam to an electric line, at a cost of \$1,600,000, the State, which owns the road but leases it to one of the great Italian operating companies, agreed to pay the cost only if the electrical operation should prove to be advantageous. The electric trains have now been running two years, and a government commission declares that it has been successful, and that the State should pay the \$1,600,000. The line is through a very fertile country, with many villages, but it has scarcely any through traffic.

A St. Petersburg newspaper makes remarks upon the Asiatic Midland railroad (formerly called the Trans-Caspian), which, however, we should remember, was built primarily for military purposes. At the harbor of Krassnovodsk, the Caspian end of the line,

great quantities of freight are stored when the railroad has been unable to forward. Great complaints made by shippers resulted in an investigation, which showed that under ordinary circumstances seven freight trains daily can be despatched, with a total of 240 cars. Of these no less than 105 are required to carry supplies for the railroad itself, 45 for petroleum for its fuel and a considerable number for water, which is lacking entirely over long stretches of the line. Materials for the new railroad from Tashkend to Orenburg and military supplies fill 55 more cars, and only 60 can be had for commercial traffic.

Manufacturing and Business.

The Lehigh Valley will soon be in the market for machine tools for its Sayre shops.

Detroit lubricators were specified for the 25 Northern Pacific locomotives mentioned in last week's issue.

George A. Chalfant, former President of the Spang-Chalfant Iron & Tube Works at Etna, Pa., died recently in Detroit at the age of 63.

The Eclipse Railway Supply Company has been incorporated in Delaware with a capital of \$500,000 by Josiah Marvel, R. C. Lupton and S. F. Coursen, all of Wilmington, Del.

The Richards Tool Company, of Boston, has been incorporated in Massachusetts with a capital of \$100,000. J. J. Stevens is President, and O. M. Bowman, Treasurer, both of Boston.

The American Oil Engine Company, of New York, has been incorporated with a capital of \$250,000. The directors are Newton Adams, H. M. Snow and J. R. Westerfield, all of New York.

The Pennsylvania Iron Works Operating Company, of Camden, N. J., has been incorporated in that State with a capital of \$200,000 by Wm. A. Heywood, J. G. Turner and J. B. Devenney, all of Camden.

Bids are wanted September 9 at the U. S. Engineer's office, 1637 Indiana avenue, Chicago, Ill., for 1,500 tons of steel and iron, for bridges, sluice gates, valves and machinery. C. S. Riche is Major of Engineers.

The Curtain Supply Company, Chicago, informs us that an appeal has been taken against the decision of Judge Platt in the suit against Herbert E. Keeler, mention of which was made in the *Railroad Gazette* last week.

The Victor Metals Company, New York, is building a rolling mill, and desires catalogues of rolling mill machinery, including furnaces. This mill will be used for converting the Victor non-corrosive silver metal into sheets and rods.

The Albany (N. Y.) Forge Company recently formed with a capital of \$80,000, will put up a machine shop 60 ft. x 60 ft., also a forge and furnace building 60 ft. x 100 ft., and will soon buy the necessary equipment. Franklin Townsend is Secretary.

The John A. Roebling's Sons Company has bought about 200 acres of land in Kinkora, N. J., on which to put up a building for a rolling mill and a steel mill. Part of its works now at Trenton will be removed to Kinkora when the new plant is completed.

The Vulcan Iron Works Company, Toledo, Ohio, is sending out an electoral vote chart having a map in two colors to show which States were Republican and which Democratic in 1900, and also the number of electoral votes for each State. The popular vote at the last election is also given, and other

information of interest in connection with the Presidential election.

The American Corrugated Furnace Company, of Camden, has been incorporated in New Jersey with a capital of \$350,000 to make iron and steel. The incorporators are: M. G. Worth, A. F. Matlock, W. C. Wallace, G. C. Albright and others, of Camden, N. J.

Charles F. Johnson, 802 Ellicott Square, Buffalo, N. Y., states that he has added a full line of railroad supplies to his equipment business, including locomotives, steam shovels, dump cars, electric cars, engines, boilers, etc., besides a number of smaller supplies pertaining to railroad and electrical equipment.

The B. F. Sturtevant Co. is fitting up quarters in its big plant to be used for an emergency hospital, in case of accident to employees. It is to be equipped with all the appliances known to medical and surgical science for the proper care of the men who may be injured in the discharge of their duties until they can be removed to their homes. A graduate nurse and medical student will be in charge and a local doctor will attend to all surgical cases.

The Northern Electrical Mfg. Co., Madison, Wis., has developed a line of variable speed motors operating on the two-wire, single voltage system and providing variations of 2 to 1, 3 to 1, 4 to 1 or 5 to 1. The company's exhibit, Section 14, Palace of Electricity, St. Louis, shows a variety of types of modern machine tools driven by Northern variable speed motors. The exhibit is in charge of a competent engineer who is prepared to supply to power users all requisite information relative to Northern machines and Northern methods.

The Bettendorf Axle Company, Davenport, Iowa, has received an order from the F. J. Lewis Manufacturing Company, Rock Island, Ill., for two of its new style tank cars, which were described in the *Railroad Gazette*, June 17, 1904. They are to be of 8,300 gals. capacity. The Germania Refining Company, Oil City, Pa., has ordered three of this same design of car, of 12,000 gals. capacity, and the Penn Refining Company, of Oil City, has ordered three 12,000 gal. Bettendorf steel underframe cars. All of these cars will be mounted on Bettendorf 50-ton steel trucks.

A. M. Cristoffanini, of Garibaldi 18, Genoa, is making inquiries in America for the equipment for a large iron plant to be built in northern Italy. The specifications include: One plate-bending rolling machine with three rolls, to be driven by three electric motors; one with four rolls and two motors; one with three rolls and one motor; one angle-bending power machine with four rolls; one planing machine for flanging iron plate; one punch-cutting machine, and two lathes, all of which are to be operated by motors with an aggregate power of about 500 h.p. There will also be 11 electrically driven traveling cranes varying in capacity from three to ten tons each.

Iron and Steel.

The Carbon Steel Works, of Pittsburg, Pa., have started up on double time in both mills.

The Columbus (Ohio) Malleable Iron Company has resumed operations after an idleness of two months.

The Central Iron & Steel Co., of Harrisburg, has a contract from the Maryland Steel Co., which is controlled by the Pennsylvania Steel Co., to roll 1,000 tons of steel plates to be used in connection with the building of the Staten Island ferryboats.

The Jones & Laughlin Steel Co., it is said, has given a contract at about \$1,000,000 for four new open hearth steel furnaces. The new furnaces will add about 350,000 tons to the yearly capacity of this establishment, making the total producing capacity 1,600,000 tons per year.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies see advertising page 30.)

The Railway Signal Association.

The September meeting of this Association will be held at the Great Northern Hotel, Chicago, on Tuesday, the 13th, at 2 p.m. The Committee on Definitions and Nomenclature will make a further report, and a report is expected from a special committee, W. A. D. Short, Chairman, which was appointed in May, to report on the proper position and arrangement of distant signals in automatic block signaling on single track lines. There will be brought up for discussion the question of agreeing on a schedule of uniform prices for signal material bought by one railroad company from another, particularly parts for repairs and renewals at interlocking plants maintained jointly by two or more roads. A proposition will be made to adopt for a given time—say one year—with agreed discounts, the prices printed in the catalogues of a prominent company which makes the principal articles used.

The annual meeting is to be held at St. Louis, October 11, the headquarters of the Association being at the "Inside Inn," inside the World's Fair grounds. Each member desiring a room should engage it himself; and it is desirable to make reservations early. Rates, including daily admission, \$1.50 to \$2.50 European and \$3.00 to \$4.00 American, without bath; with bath, \$3.50 and \$5.00 up. An advance remittance of \$5.00 has to be made. The chairman of the Committee of Arrangements for the meeting is Mr. M. Wuerpel, Jr., Frisco Building, St. Louis.

PERSONAL.

—Mr. G. B. Cliff, Superintendent of the Seattle Division of the Northern Pacific, went boating on Tuesday afternoon, August 9, and it is believed that he is lost, as searching parties failed to find him after eight days. Mr. Cliff has been connected with the Northern Pacific for a number of years.

—Mr. John Ruggles Slack, whose death occurred in New York City on August 1st, had for the past five months been Assistant to General Superintendent Stone, of the Delaware & Hudson Company. Two years previous to that Mr. Slack was Superintendent of Motive Power of that road. He was 41 years old and was educated at Columbia University and Stevens Institute. His railroad career was begun on the New York Central & Hudson River, where he was Inspector of Locomotives and Mechanical Engineer. In 1899 he went to the Delaware & Hudson, as Assistant Superintendent of Motive Power, and three years later was made Superintendent of Motive Power, from which position he was promoted to be Assistant to the General Superintendent.

—Mr. J. W. Oplinger, the new Superintendent of Motive Power of the Atlantic Coast Line, is a native of Wilkesbarre, Pa. He started as a machinist apprentice at Ashley, Pa., with the Central Railroad of New Jersey in 1874, and stayed with this company until 1880, when he went to the Lehigh

Valley. After working for this company for several years he went to New Mexico, where he worked for the Atchison, Topeka & Santa Fe for a number of years. In 1886 Mr. Oplinger returned to Ashley, where he was gang and erecting foreman. In 1894 he left this company to take a similar position on the New York, Susquehanna & Western at Stroudsburg, Pa., and six years later resigned to go to the Atlantic Coast Line as Master Mechanic at Rocky Mount, N. C. In April of this year he was made Mechanical Inspector of the Coast Line system, and in the early part of this month was promoted to be Superintendent of Motive Power.

—Mr. Thomas Paxton, the new Master Mechanic of the El Paso & Southwestern, began his railroad work as an apprentice on the Baltimore & Ohio, and for several years he was a journeyman machinist. In 1884 he became roundhouse foreman on the Atchison, Topeka & Santa Fe, which company he served continuously for the next 18 years. During this time he was foreman at Florence, Kan., and later at Newton; Master Mechanic at Argentine, Kan., also Master Mechanic of the Middle Division for over seven years, and of the Chicago Division for about three and one-half years. From this latter position he was transferred to Topeka, where he had charge of the main shops. Then for a year he was Mechanical Superintendent of the Gulf, Colorado & Santa Fe. In 1903 he went to the St. Louis & San Francisco, and he was made Master Mechanic of the Central Division. In February last he left and went to the St. Louis, Iron Mountain & Southern, and now changes again as above. In his new position Mr. Paxton will have charge of the motive power department, with the title of Master Mechanic, and his office will be at Douglas, Ariz.

—Mr. George Clinton Gardner, formerly for a number of years General Superintendent of the Pennsylvania Railroad at Altoona and well known by his subsequent connections with a number of other railroads, died at his home at Richmond Hill, L. I., on Friday of last week. Mr. Gardner was born in Washington in 1834, and was the son of Adjutant General Charles K. Gardner. He entered the engineer corps of the Army at the age of 16, and took part in establishing the Mexican boundary and also the Canadian boundary on the Pacific Coast. His first railroad service was in 1869, when he began on the Philadelphia & Erie as Assistant Engineer. The next year he was made Assistant Superintendent of Motive Power on the Pennsylvania, and from 1871 to 1879 he was General Superintendent, as above stated. In the latter year he resigned to go to Massachusetts as the Manager of the 44 miles of road, now a part of the Boston & Maine, and including the Hoosac tunnel, which was then owned by the State. But the State soon sold this railroad, and Mr. Gardner then went to the Mexican International, where he was General Manager. He was subsequently connected with the Buffalo, New York & Philadelphia, the Ohio River and the Pacific Company of New York and Peru.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—F. P. Barnes has been appointed Division Master Mechanic at Raton, N. M., succeeding A. Harrity.

California Northwestern.—See North Shore.

Canadian Pacific.—A. Price has been appointed Superintendent of Transportation for the western lines, with headquarters at Winnipeg. F. Dillinger, Superintendent at Brandon, Man., has been appointed to

succeed Mr. Price as Superintendent at Fort William, Ont., and Mr. Dillinger in turn is succeeded by J. J. Scully.

Chicago & Eastern Illinois.—William Campbell, General Freight Agent, has resigned.

Chicago, Peoria & St. Louis of Illinois.—M. D. Stewart, hitherto Master Mechanic of the Rio Grande, Sierra Madre & Pacific, has been appointed Master Mechanic of the C., P., & St. L. of Ill., with headquarters at St. Louis, Mo.

Cincinnati, Findlay & Ft. Wayne.—The officers of this company are: President, E. Zimmerman; Vice-President, Russell Harding; Secretary, T. J. Walsh, and Treasurer, F. H. Short.

Denver & Rio Grande.—T. E. Swann, Assistant General Passenger Agent, has resigned, effective Sept. 1.

Denver, Northwestern & Pacific.—A. Struthers, hitherto Master Mechanic of the El Paso & Southwestern, has been appointed Master Mechanic of the D., N. W. & P., with headquarters at Denver, Col.

El Paso & Southwestern.—See Denver, Northwestern & Pacific.

Erie.—A. C. Elston, Superintendent of the New York, Susquehanna & Western, has been appointed Superintendent of the New York and the Greenwood Lake Divisions of the Erie, and of the Northern of New Jersey and the New Jersey & New York railroads, succeeding J. F. Maguire. Mr. Elston's office is at Jersey City, N. J.

Grand Trunk Pacific.—The officers of this company are: President, C. M. Hays; First Vice-President and General Manager, F. W. Morse; Second Vice-President, W. Wainwright; Secretary, H. Phillips; Treasurer, F. Scott, and General Auditor, H. W. Walker. All of the above named gentlemen are officers of the Grand Trunk.

Lehigh Valley.—W. O. Sprigg having resigned, the New York Division has been consolidated with the New Jersey and Lehigh Division, with George M. Harleman, Superintendent, Easton, Pa., in charge. H. C. Davis has been appointed General Agent at New York City.

Mexican.—T. Corry has been appointed Superintendent of Permanent Way, with headquarters at Mexico, Mex., succeeding J. Phillips, resigned.

Mexican Union.—See Pittsburg, Shawmut & Northern.

National of Mexico.—Thomas Milan, Superintendent of Motive Power and Machinery, has resigned. (See Vera Cruz & Pacific.)

New York, Susquehanna & Western.—See Erie.

North Shore.—A. W. Foster, President of the California Northwestern, has been elected President of the N. S., succeeding John Martin. We are informed that the reports which stated that General Freight and Passenger Agent G. W. Heintz had resigned are entirely without foundation.

Pittsburg, Shawmut & Northern.—John Byrne has been chosen to be Chairman of the Board. This is a new office recently created. L. M. Johnson, General Manager of the Mexican Union, has been elected to succeed Mr. Byrne as President of the P., S. & N.

Pullman Company.—A. J. Grant has been appointed District Superintendent, with office at New York, succeeding R. C. Wagner, who has been transferred to Albany, N. Y., to relieve W. H. Deal, who in turn has been transferred to Detroit, Mich., succeeding C. C. Cox, who has succeeded Mr. Grant as District Superintendent at Chicago, Ill.

Rio Grande, Sierra Madre & Pacific.—M. D. Stewart, Master Mechanic, has resigned. (See Chicago, Peoria & St. Louis of Illinois.)

San Pedro, Los Angeles & Salt Lake.—H. Hawgood, hitherto Chief Engineer, has

been appointed Consulting Engineer, with headquarters at Los Angeles, Cal.

Southern.—L. Green, hitherto Assistant General Freight Agent, has been appointed General Freight Agent, with headquarters at Atlanta, Ga., succeeding E. A. Niel, resigned. G. R. Browder, hitherto Division Freight Agent at Birmingham, Ala., has succeeded Mr. Green at Atlanta.

State Railroad Commission of Georgia.—Hon. Joseph M. Brown, formerly and for many years Traffic Manager of the Western & Atlantic, has been appointed a member of the Railroad Commission of Georgia, succeeding G. Gunby Jordan.

Vera Cruz & Pacific.—Thomas Milan, hitherto Superintendent of Motive Power and Machinery of the National of Mexico, has been elected President of the V. C. & P., succeeding R. B. Pegram, resigned.

LOCOMOTIVE BUILDING.

The Central of Georgia is having 20 locomotives built at the Baldwin Locomotive Works.

The Illinois Southern is having two locomotives built at the Baldwin Locomotive Works.

The Chicago & Western Indiana has ordered three mogul (2-6-0) locomotives and three suburban locomotives from the Rogers Locomotive Works. The specifications of these locomotives may be found in our issue of August 12.

CAR BUILDING.

The Coahuila & Pacific has ordered one day coach from Barney & Smith.

The Chicago, Rock Island & Pacific is reported to be about to order 22 cabooses.

The Delaware, Susquehanna & Schuylkill is reported in the market for over 100 freight cars.

The Colorado-Utah Construction Company is having 50 freight cars built by the Pullman Co.

The Southern Indiana has ordered 125 box cars of 60,000 lbs. capacity from Barney & Smith.

The Kentucky & Tennessee has ordered 10 wooden flat cars from the American Car & Foundry Co. These cars will be 36 ft. long and will have a capacity of 60,000 lbs.

The Niles Car Manufacturing Company is reported to have received a contract for building a number of street cars for use on the Montreal Street Railway, Montreal, Canada.

The St. Louis Southwestern is reported to be about to place an order with the American Car & Foundry Co. for the following equipment: Five baggage cars, 10 chair cars and five combination baggage and mail cars.

The Monongahela Connecting, as reported in our issue of August 12, has ordered 100 wooden coke cars of 60,000 lbs. capacity from the American Car & Foundry Co. The railroad has also placed orders for 50 steel drop-bottom gondolas of 100,000 lbs. capacity with the Standard Steel Car Co., and for 50 steel hopper cars of 100,000 lbs. capacity with the South Baltimore Steel Car & Foundry Co. The coke cars will be 36 ft. long over end sills, 8 ft. 4 in. wide over side sills and 7 ft. high from sills to top of sides. The steel hopper cars will be 33 ft. long over end sills, 10 ft. wide over sides and 10 ft. high. The steel drop-bottom gondolas will be 40 ft. long over end sills, 9 ft. 10 in. wide over sides and 3 ft. 9 in. high. These cars are to be similar to those built for the same company two years ago, except for the fact that, although their capacity is placed at 100,000 lbs., the cars are to be built with the understanding that they will carry a load of 200,000 lbs.

BRIDGE BUILDING.

ATHENS, GA.—The County Commissioners have decided to build two large steel bridges, one over Elk River at Redusshoal, in the northern part of the county, and the other over Limestone Creek at the Huntsville and Brown ferry road, in the southern part of the county.

AUBURN, NEB.—Bids will soon be asked for two stone arches, over Central avenue and Fourth street, also for the stone abutments of the Seventh street bridge.

BEATRICE, NEB.—The County Commissioners have ordered the building of a large number of bridges in Gage County.

BOSTON, MASS.—The new Broadway bridge has been opened to foot traffic. When completed the structure will have cost about \$400,000.

CELINA, OHIO.—Bids are wanted September 3 by the County Commissioners for the substructure and superstructure of the following steel bridges over the Wabash River: At Wabash a bridge 120 ft. long and 16 ft. wide; and a bridge 110 ft. long and 16 ft. wide at Herron road; also a steel bridge 100 ft. long and 16 ft. wide on the Krenning road, and a steel bridge 100 ft. long and 16 ft. wide on the Grimmie road, in Mercer County. T. A. Weis is Auditor.

CHICAGO, ILL.—This city will soon ask for bids on two lift bridges of the type designed by City Engineer John Ericson. The one for Archer avenue will call for about 500 tons of steel, and the other, at North avenue, for about 600 tons. (July 29, p. 46.)

Bids are wanted August 20 by the Department of Public Works for repairs to the Thirty-fifth street bridge over the south fork of the Chicago River. F. W. Blocki is Commissioner.

CINCINNATI, OHIO.—The Cincinnati, Hamilton & Dayton, it is reported, will build about 19 new bridges along the line of its road.

Bids are wanted September 6 by the Board of Public Service for the superstructure of the Grandin viaduct over Delta avenue, from West Crescent avenue to Edwards road, to consist of five spans of 98 ft. and seven spans of 42 ft., with two girder spans each 26 ft. 7 in. at the east and west abutments. The total length of the superstructure will be 840 ft. The roadway will be 34 ft. 6 in., with pavement on steel buckle plates, and cement sidewalks 6 ft. 8 in. wide. J. P. Gerstle is Acting Clerk.

COMANCHE, TEX.—Bids are wanted August 25 by J. O'Neill, County Clerk, for building a steel bridge 70 ft. long.

DANVILLE, VA.—Residents have petitioned for a bridge over the Dan River, to cost about \$30,000.

DAYTON, OHIO.—The Board of Public Service has been instructed to build a bridge over the Great Miami at Herman avenue.

DENVER, COLO.—Bids are wanted August 22, by L. G. Carpenter, State Engineer, for building a bridge 150 ft. long and 16 ft. wide, with 4 ft. tubular piers, over the Arkansas River at La Junta.

DETROIT, MICH.—The receiver of the Detroit Southern has given to the American Bridge Co. a contract for three new steel bridges.

GILMERTON, VA.—The Norfolk & Western will widen its bridge over the south branch of the Elizabeth River, and put in a new steel draw, at a cost of about \$90,000.

GLENOLDEN, PA.—The Town Council has passed an ordinance granting permission to the Philadelphia, Baltimore & Washington to build a new four track bridge at South avenue.

HARRISBURG, PA.—The State Board of Public Buildings and Grounds has given a contract to Nelson & Buchanan, of Chambersburg, at \$47,600, for building the bridge at Zellenople, in Butler County.

Bids are wanted August 30 by J. M. Schumaker, Superintendent of Public Grounds and Buildings, for rebuilding the substructure and superstructure of the bridge over Redbank Creek at Pickering street, in Jefferson County.

INDIANAPOLIS, IND.—The Board of County Commissioners has given a contract for the new steel plate girder bridge of three spans, each 101 ft. long, over White River, at Crows Nest, to the New Castle Bridge Co., at \$15,490 for the superstructure. The cost, including the concrete and stone substructure, will be about \$23,000. Other bids for the superstructure were: Canton Bridge Co., \$17,997; Lafayette Bridge Co., \$16,900; Anderson Bridge & Scraper Co., \$18,553; Noelke-Richards Iron Works, \$17,000; R. R. Moorman, \$18,200; Joliet Bridge & Iron Co., \$19,300; Indiana Bridge Co., \$17,500; King Bridge Co., \$18,447, and Brown-Ketcham Iron Works, \$17,500.

KNOXVILLE, TENN.—The Mayor and Board of Aldermen have passed an ordinance requiring the Knoxville, La Follette & Jellico and the Southern to build a bridge or viaduct over the tracks at Clinch avenue West. The cost of the work will be about \$90,000.

LOS ANGELES, CAL.—Plans are ready for replacing with a new structure the Sunset boulevard bridge over Lake Shore avenue. The bridge will cost \$17,200.

MARIETTA, WASH.—Whatcom County Commissioners are asking for bids for a bridge, with 157 ft. draw and two 50 ft. spans and approaches, to be built over the Nooksack River.

MARION, IND.—The County Commissioners have given a contract to the Attica Bridge Co. at \$24,000 for building the bridge over Mississinewa River in the east end of the city.

MONTGOMERY, ALA.—The Mayor has approved an ordinance providing for a bridge over the Central of Georgia tracks on Madison avenue.

MIDDLETOWN, OHIO.—The Auditor of Butler County has been instructed to ask bids for the Morgenthau bridge over Cotton run; the McCurley bridge, over Banklick, and the Hughes station bridge over Gregory Creek.

NATCHEZ, MISS.—Bids are wanted at the office of the Chancery Clerk September 5 for building five steel bridges in Adams County; at Washington over St. Catherine's Creek; at Robbins bayou; on the Woodville road at Bullhead bayou; at Cross road from St. Catherine's creek to Woodville road, and at Surzet's bayou on Kingston road. J. F. Jenkins is Clerk.

NEW HAVEN, CONN.—The plans for the million-dollar improvements in the railroad cut in this city by the New York & New Haven Company have been submitted to the Board of Aldermen, and include the replacing by the company of the old bridges at Fair street, Wooster street, Chapel street, Court street, Union street, Grand avenue, Olive street, Osborn street, Bradley street, Franklin street, Hamilton street, Wallace street and East street by new structures.

SCRANTON, PA.—Four important bridges have been pronounced unsafe by an expert appointed to examine them. They are situated at Green Ridge, Elm, Lackawanna and Scranton streets. It is recommended that new bridges be built at Scranton and Elm streets.

SOUTH BETHLEHEM, PA.—A county bridge 48 ft. long and 50 ft. wide will be built over Northampton Creek.

SPOKANE, WASH.—Bids are wanted August 23 by Z. Stewart, Clerk of the County Commissioners, for building a bridge in Spokane County.

REDDING, CAL.—Bids are wanted September 7 by Shasta County Clerk for building the Stillwater and Cow Creek bridges.

YOUNGSTOWN, OHIO.—The Pittsburg & Lake Erie, it is said, will at once build a steel

bridge 878 ft. long over its tracks in East Youngstown.

Other Structures.

BROWNWOOD, TEX.—The Fort Worth & Rio Grande is preparing plans for a new station.

CHARLESTON, W. VA.—The Chesapeake & Ohio, it is reported, will at once build a passenger station to cost about \$50,000.

CHIHUAHUA, MEX.—The Chihuahua & Pacific will build a tie-treating plant, with a capacity of 1,000 ties daily.

COLUMBUS, KY.—The St. Louis, Iron Mountain & Southern and the Mobile & Ohio, it is reported, will jointly build a union passenger station.

COLUMBUS, OHIO.—The Baltimore & Ohio has under consideration the question of building a large freight house at the corner of Naghten and Third streets, to cost about \$300,000.

COMEZ PALACIO, STATE OF DURANGO, MEX.—The Mexican Central will soon commence buildings for its new shops at this place.

CORDELE, GA.—The Atlantic & Birmingham, it is reported, will build a passenger station here.

DERRY, PA.—The Pennsylvania, it is said, will soon put up a large roundhouse and a repair shop.

FORT MYERS, FLA.—The Atlantic Coast Line, it is reported, has bought land as a site for its new passenger station.

MARION, S. C.—The Atlantic Coast Line is having plans made for building a brick passenger station 26 x 91 ft., to cost about \$10,000.

MONROE, N. C.—The Seaboard Air Line will submit plans for its new passenger station, the city having donated the land.

NEW ORLEANS, LA.—A building permit has been given to the Yazoo & Mississippi Valley Railroad to put up a brick warehouse, to cost about \$30,000, on which work will soon be commenced.

The Government will soon ask bids for putting up several new buildings at the Algiers naval station. Captain Frederick Singer will have charge of the work.

PINE BLUFF, ARK.—The St. Louis Southwestern is negotiating for a site for its passenger station. The company will also build a new freight house on Third avenue.

PARIS, TEX.—The St. Louis & San Francisco, it is reported, is locating the site for its new passenger station, which will be of stone.

PITCAIRN, PA.—The Pennsylvania, it is reported, has given a contract to L. C. Focht, of Reading, Pa., for the proposed addition to its machine repair shops here.

PORTLAND, ME.—The work of rebuilding the Grand Trunk stockyards at East Deering, destroyed by fire last spring, will be begun in a few weeks. The yards and stables will be much larger than those destroyed and will have space for 4,000 head of cattle or 36,000 head of sheep.

ROANOKE, VA.—The Norfolk & Western has been granted a building permit for a new passenger station and train sheds to be built at Commonwealth and Shenandoah avenues, to cost about \$99,000.

SAUGATUCK, CONN.—The New Haven road, it is reported, will build a new passenger station.

TERRE HAUTE, IND.—The Vandalia is planning to enlarge its shops.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ARIZONA & COLORADO.—Articles of incorporation have been filed by this company in Colorado with an authorized capital of \$2,000,000. It is proposed to build a railroad from Tucson, Ariz., to Durango, Colo., with

branch lines from Durango to Silverton and Dolores. Surveys are now reported in progress. E. M. McFarland, E. I. Ives, L. H. Manning, C. E. Walker and others, of Tucson, Ariz., are incorporators.

ATCHISON, TOPEKA & SANTA FE.—A contract has been let by this company for extending its line from Owassa, Ind. T., to Tulsa, 12 miles. The extension will give a southern outlet to the Bartlesville branch, and will connect with the St. Louis & San Francisco and Midland Valley at Tulsa.

BETHEL GRANITE RAILROAD.—Articles of incorporation have been obtained by this company in Vermont with an authorized capital of \$50,000. It is proposed to build a railroad from a connection with the Central Vermont near Bethel to quarries about ten miles away. C. M. Hays, of the C. V., is President.

BIRMINGHAM, COLUMBUS & ST. ANDREWS BAY.—It is officially announced that work has been begun on this proposed railroad by W. O. Butler, of Chipley, Fla. It is expected that trains will be running between Chipley and St. Andrews, 50 miles, by December 1. It is proposed eventually to extend the line north to Birmingham, 300 miles. J. M. Garrett, Montgomery, Ala., may be addressed. (April 1, p. 264.)

CEDAR RAPIDS & IOWA CITY (ELECTRIC).—This interurban line, running from Cedar Rapids, Iowa, to Iowa City, 26 miles, has been completed and opened for traffic. The line will be used both for freight and passenger traffic, and it is the intention of the company to eventually extend from Iowa City to Burlington.

CHICAGO, BURLINGTON & QUINCY.—The cut-off running from Old Monroe to Mexico, Mo., 65 miles, has been completed, and will be opened for traffic on September 1.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Press reports state that work will be begun at once at Mitchell, Ill., on a new yard which will be laid out to contain about 44 miles of track. This yard, which is only a few miles south of Alton, will be used chiefly for making up eastbound trains. A large roundhouse and other buildings will also be built.

COLUMBIA RIVER & OREGON CENTRAL.—Articles of incorporation have been filed by this company in Oregon. It is proposed to build from Arlington south to Condon, 40 miles, with branch lines from Ione southwest to Condon, 25 miles, and from Arlington west to Rock Creek, 10 miles. J. C. Ainsworth, Arlington, Ore., is President. This road is said to be a project of the Oregon Railway & Navigation Company.

DES MOINES INTERURBAN.—H. H. Polk, President, has announced that this company will build a line from Des Moines through Grimes to Adel, 20 miles. The company has purchased 50 acres of land in Des Moines for freight terminals, and has received material for a steel bridge to cross the Des Moines river just west of the terminals of the Flint Valley Line. It is stated that work will be begun at once.

FLORIDA EAST COAST.—An officer writes that bids will be asked some time in October or November for building the extension from Homestead south to Key West. Surveys are now in progress. The general direction of the line is across the marshes between Homestead and Key Largo; thence south on Key Largo and along the various keys lying between Key Largo and Key West. The work will be unique. The keys are composed of coralline rock, but are sufficiently above ordinary tides to permit of building a roadbed. There are many channels or openings between the islands to be bridged. The proposed maximum curvature is 4 degrees. The number of steel bridges is unknown, but will probably be in the neighborhood of 30, from 100 ft. upwards in length. (August 5, p. 51.)

GRAND TRUNK PACIFIC.—This company was organized at Montreal on August 10. C. M.

Hays, General Manager of the Grand Trunk, was elected president. He is reported as saying that surveys are now being made on that section of the road between Winnipeg and the Pacific coast. It will take considerable time for these surveys to be completed. There is, however, a possibility of beginning work this year. Mr. Hays also said that he could not state what place on the Pacific coast would be decided upon as a terminus.

GUELPH & GODERICH.—Contracts have been let for building this railroad between Guelph and Goderich, Ont. The work has been divided into eight sections of ten miles each. Of these, A. M. Piggott, of Hamilton, Ont., has the contract for sections 2, 3, 7 and 8, and D. B. Campbell, of Strathroy, has the contract for sections 1, 4, 5 and 6. Work will be begun at once, and it is stated that the line will be open for traffic by October, 1905. P. A. Peterson is Chief Engineer, and J. W. Leonard, President. (August 12, p. 57.)

LA DICHA & PACIFIC.—Articles of incorporation have been filed by this company in the City of Mexico. The road is to be built from the La Dicha mines in the State of Guerrero to the Bay of Acapulco, 45 miles. The sea terminus of the road is Port Marques, situated on the Bay of Acapulco. R. E. Morrison, City of Mexico, is Vice-President and General Counsel.

LAKE ERIE & PITTSBURG.—It has been officially announced that surveys have been completed for this new road. The company recently purchased 140 acres of land at Lorain, Ohio, for terminal grounds. The right of way from Lorain to Youngstown has been secured, and the road will be completed to Youngstown within a few months. It is proposed to build from Youngstown to Pittsburg, but no details are given out concerning that part of the line. Wm. Kennedick, Kansas City, Mo., is President. (See Construction Supplement.)

MEXICAN ROADS.—Press reports say that the Ferrocarril Mineral, which runs from Chihuahua to the Santa Eulalia mining camp, 15 miles, is to be changed from narrow to standard gauge.

The Amparo Mining Company is about to build a railroad from its mines to a point on the Mexican Central near Chihuahua. The line will be about ten miles long. Charles K. Smith is vice-president of the company.

Surveys have been finished for the proposed extension of the Mexican Coal & Coke Co.'s line from Las Esperanzas to Nogalitas, 24 miles. Messrs. Hampson & Smith, City of Mexico, are the contractors. G. A. Strahan is the engineer in charge.

MISSOURI PACIFIC.—The Eldorado & Bastrop branch of the Missouri Pacific, running from Eldorado, Ark., southeast to Bastrop, La., 50 miles, has been completed, and is now open for freight and passenger service. The new line joins the New Orleans & Northwestern at Whites.

MOUNT HAMILTON RAILROAD.—This company has been organized in California to build an electric railroad in the vicinity of San Jose. Surveys are reported in progress and rights of way are being secured.

NATIONAL OF MEXICO.—It is reported that the branch line which is now being built from Monterey to a connection with the isolated piece of road which runs from San Miguel to Matamoras, will be extended to a point on the Rio Grande border about four miles south of Rio Grande City, Texas, where it will connect with the Hidalgo branch of the St. Louis, Brownsville & Mexico.

It is said that application will be made to the Mexican Government for a concession to extend this company's line from Uruapan to Colima and from the latter place to the port of Manzanillo, on the Pacific coast. The harbor improvements at Manzanillo, which have been in progress for several years under direction of the Mexican Government, will soon be completed, and it is stated that

the Government wishes to extend its system of railroads to that place.

QUEBEC, NEW BRUNSWICK & NOVA SCOTIA.—Messrs. Mackenzie & Mann have filed with the Department of Railways and Canals the plans of the route of this proposed railroad which was chartered by Parliament last session. The line will leave a point on the Great Northern and connect with the Quebec bridge. From there it will run southwesterly via the valley of the Etchemin river to the Maine State line. After crossing this State, and entering the province of New Brunswick, the route will be via Woodstock to Fredericton and Moncton, thence through the northern portions of the counties of Westmoreland and Cumberland to Pugwash Junction. From the latter point the Intercolonial Short Line to New Glasgow will be utilized and from New Glasgow the line which Messrs. Mackenzie & Mann are now building to Country Harbor.

SOUTHERN.—An officer writes stating that no work is projected on an extension from Itta Bena, Miss., to Belzona, as recently reported in press despatches from the South.

TOPEKA, FRANKFORT & NORTHWESTERN.—At a recent meeting of the stockholders it was voted to begin work at once on this proposed railroad from Topeka, Kan., northwest through the counties of Shawnee, Jackson, Pottawatomie and Marshall to Frankfort, 60 miles. P. L. Wise, Topeka, Kan., is Chief Engineer. (See Construction Supplement.)

WILLAMETTE VALLEY ELECTRIC.—Incorporation has been granted this company in Oregon with an authorized capital of \$1,000,000. It is proposed to build electric roads from Eugene, Ore., south to Cottage Grove, west to Corvallis, east to Blue river and north to Salem. J. F. Wilson, M. S. Taft and others are incorporators.

RAILROAD CORPORATION NEWS.

ATLANTIC & BIRMINGHAM.—See Brunswick & Birmingham below.

ATLANTIC & NORTH CAROLINA.—A special meeting of the stockholders will be called for September 1 to receive proposals for a lease of the road. This meeting has been called at the instance of Governor Aycock. Three propositions are said to be in the Governor's hands for leasing the road, and it is thought probable that other offers will be laid before the stockholders at the meeting.

BALTIMORE & SOUTHERN.—This road, with all its rights and franchises, was sold at public auction on August 15 under a deed of trust. The property was bid in by the trustee, M. A. Soper, for \$50,000. Mr. Soper is said to have acted for Edward Lauterbach, who holds a mortgage of \$55,000 on the road. The road was never completed, but it was projected to run from Drum Point, near Baltimore, through Calvert and Anne Arundel counties to a connection with the Annapolis, Washington & Baltimore, about 60 miles.

BRUNSWICK & BIRMINGHAM.—This road was sold at public auction on August 9 by the receiver and was bid in by B. M. Robinson for \$1,000,000 in behalf of the Atlantic & Birmingham. The latter will take possession at once.

BUFFALO, ROCHESTER & PITTSBURG.—The annual report of this company for the fiscal year ending June 30 last shows gross earnings amounting to \$7,529,000, an increase of \$232,000 over 1903. Operating expenses increased \$331,000, leaving a decrease in net earnings of \$99,000. After payment of fixed charges, special appropriations and dividends, there remained a surplus for the year of \$157,875. Crediting the surplus account with the \$497,389 deducted for special appropriations, there was a surplus before dividends of \$1,513,000. The bonded indebtedness of the company was increased during the year by

\$893,000, mostly for additional rolling stock.

CINCINNATI, HAMILTON & DAYTON.—H. B. Hollins & Co., New York, have announced that a syndicate has been formed to provide funds for the purchase of the outstanding preferred stock of the C. H. & D. The amount required is about \$8,000,000, as there is outstanding \$1,074,500 of 4 per cent. preferred stock and \$6,925,500 of 5 per cent. non-cumulative preferred stock. If this stock is acquired all opposition to the consolidation of the C. H. & D. with the Pere Marquette will be removed.

CONNEAUT & ERIE TRACTION.—A refunding mortgage has been made by this company with the Fidelity Trust Company, of Philadelphia, to secure \$1,250,000 of 5 per cent. 20-year gold bonds. These bonds are subject to call at 110 and interest. Of the refunding bonds, \$175,000 is outstanding and \$800,000 is being reserved to retire the existing first-mortgage bonds. The road extends from Conneaut, Ohio, to Erie, Pa., 33 miles. R. L. Forest, 421 Chestnut street, Philadelphia, is President.

NEW YORK & JERSEY.—After a hearing lasting two months, the commission, appointed by Judge Dixon, of the Supreme Court of New Jersey to appraise the value of the right of way and assess the amount of damages in the condemnation proceedings filed by this company against the Delaware, Lackawanna & Western, has handed down a decision for \$10,300 in favor of the D. L. & W. The amount claimed by that company was \$5,700,000. The right of way which has been granted will give the New York & Jersey and the Hoboken & Manhattan Tunnel companies sufficient land for the proposed terminals in Hoboken. An appeal has been filed by the D. L. & W. W. G. McAdoo is President of the New York & Jersey.

NEW YORK & PORT CHESTER.—The Railroad Committee of the Board of Aldermen in New York has denied the application for a franchise to cross several streets in the Borough of the Bronx, on the ground that sufficient reliable information could not be obtained as to the financial standing and responsibility of the company. This road is the rival of the New York, Westchester & Boston, which recently obtained a franchise through the Bronx from the Board of Aldermen.

NEW YORK, ONTARIO & WESTERN.—A "stockholders' protective committee" has sent out a notice to all the stockholders of the road stating that suit will shortly be begun to compel the dissolution of the voting trust. According to an agreement of 1885, the voting trust cannot be dissolved until the retirement of all the preferred issue. Of \$2,000,000 of this stock, there is \$4,000 still outstanding. (July 8, p. 30.)

NORTHERN TRACTION.—A mortgage for \$3,500,000 has been filed by this company with the Knickerbocker Trust Company of New York and Benjamin L. Allen, co-trustee. The mortgage covers the proposed electric railroad from South Bend, Ind., west to Chicago, 90 miles, passing through New Carlisle, La Porte, Valparaiso and Hammond. W. C. Nelson, South Bend, is President.

ST. LOUIS SOUTHWESTERN.—The advance figures of this company's report for the year ending June 30 last show an increase in gross earnings of \$370,910. Operating expenses increased \$165,433, leaving an increase in net earnings of \$205,477. As income derived from other sources decreased \$92,133, the total net income for the year (\$2,318,357) increased only \$113,344.

SEABOARD AIR LINE.—Announcement has been made by President John Skelton Williams that the option which was given on August 11, 1903, to Ladenberg, Thalmann & Co., on a large block of preferred and common stocks of this company, has expired.



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EDITORIAL ANNOUNCEMENTS:

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CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

FRIDAY, AUGUST 19, 1904.

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